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ABSTRACT

This 2001 Association of Small Computer Users in Education (ASCUE) conference proceedings briefly describes ASCUE and its listserver, lists the 2000-2001 ASCUE Board Members, and provides abstracts of the pre-conference workshops. The conference papers and abstracts of papers that follow include: "Microsoft Project 2000--Keeping Projects on Time and within Reasonable Budget"; "Add Streaming Media for the Web to Your Technological Toolkit"; "Distance Education for Technology Related Courses"; "Personal Knowledge Management: Framework for Integration and Partnerships"; "Distance Education, E-Core and Faculty-Instructional Design Collaboration"; "MOUS Certification Solutions"; "SAM 2000 Skills Assessment Manager"; "Faculty Support in a 'Time of Inconvenience'"; "Implementing a Campus-Wide Event Scheduling System"; "E-Mail: Just What Sort of Communication IS This?"; "Fast Track Network Certifications and Competition from Non-Traditional Educational Institutions"; "Preparing Tomorrow's Teachers To Use Technology"; "Web Abroad: Sharing the Learning, Staying in Touch"; "Online Learning at Mercer with WebCT"; "Distance Education for Printing Employee Training: A Model for Certificate Based Education"; "Multi-Tier Online Interventions: Forging Partnerships with a Virtual Business Training Center"; "Developing and Deploying Intelligent Agents in Education"; "A Web-Based Testing System for Introductory Mathematics Courses II"; "Using Microsoft Terminal Server To Support Mathematics Courses"; "Developing and Maintaining an On-Line Catalog as a Cohesive, Integral Part of your .edu Web Site"; "Becoming a Cisco Networking Academy"; "Breaking Away from the Desktop: Applications that Synchronize Pocket PCs and Campus Database Systems"; "Tailoring ASP Services for Institutions of Higher Education: The Importance of Performance Contingency Planning"; "Comprehensive Ubiquitous Computing: Beyond the Laptop Initiative"; "The Possibilities and Perils of Streaming Multimedia to Students"; "Progress Report-Microsoft Office 2000-Lynchburg College Tutorials"; "Technology and Education in a Rural Environment: Booth Teacher Training Initiative"; "Introducing Disciplinary Thinking Through the Development of an On-Line Tutorial"; "Technology in the Classroom, I'm Scared 'A Professor's Journey'"; "Stakeholder Impact on the IT Curriculum"; "Individual & Collaborative Calendaring Using CorporateTime"; "Creating a Multicultural Context Using Technology"; "Storage Area Network: A Case Study

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ASCUE

ASSOCIATION OF SMALL COMPUTER USERS IN EDUCATION

"Continuing Second Quarter Century of Service"

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Proceedings of the 2001 ASCUE Summer Conference

34th Annual Conference
June 10 - 14, 2001

North Myrtle Beach, South Carolina

Edited by Peter Smith, Saint Mary's College

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Association of Small Computer Users in Education
"Continuing Second Quarter Century of Service"

Proceedings of the 2001 ASCUE Summer Conference
34th Annual conference
June 10 -14, 2001
Myrtle Beach, South Carolina
Web: http://www.ascue.org

ABOUT ASCUE

ASCUE, the Association of Small Computer Users in Education, is a group of people interested in small college computing issues. It is a blend of people from all over the country who use computers in their teaching, academic support, and administrative support functions. Begun in 1968 as CUETUG, The College and University Eleven Thirty User's Group, with an initial membership requirement of sharing at least one piece of software each year with other members, ASCUE has a strong tradition of bringing its members together to pool their resources to help each other. It no longer requires its members to share homegrown software, nor does it have ties to a particular hardware platform. However, ASCUE continues the tradition of sharing through its national conference held every year in June, its conference proceedings, and its newsletter. ASCUE proudly affirms this tradition in its motto "Continuing Second Quarter Century of Service."

ASCUE's ASCUE-L LISTSERVER

Subscribe by sending the E-mail message SUBSCRIBE ASCUE-L yourname to listserv@gettysburg.edu. The listserv itself is ascue-l@gettysburg.edu. In order to stop the flooding of the listserv with unwanted solicitations, we have set it up so that you will have to send messages from the address you subscribed from.

NEED MORE INFORMATION?

Direct questions about the contents of the 2001 Conference to Fred Jenny, Program Chair, ASCUE '01, Associate Professor of Math and Computer Science, Grove City College, 100 Campus Drive, Grove City, PA, 16127, 724-458-2071, fjjenny@gcc.edu .
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Keynote Speaker

Dr. **Charles M. Reigeluth** has a B.A. in Economics from Harvard University and a Ph.D. in Instructional Psychology from Brigham Young University. He taught science at the secondary level for three years and spent ten years on the faculty of the Instructional Design program at Syracuse University, culminating as chair of the program. He has been a Professor in the Instructional Systems Technology Department at Indiana University since 1988, and served as chairman of the department from 1990-1992. Dr. Reigeluth's interests include reinventing public education and designing high quality learning resources. He has published eight books and over eighty articles and chapters on those subjects. He is a major developer of a guidance system for facilitating systemic change in public school districts, and is the major developer of several instructional design theories, including the elaboration theory and simulation theory. Two of his books received an "outstanding book of the year" award from the Association for Educational Communications and Technology.

Charles will give the keynote address on Monday morning. His topic is "A New Paradigm of Learning and Instruction." This presentation addresses four questions:

- What is a new paradigm, and is it needed?
- What might a new paradigm of education be like?
- What might the new paradigm of instruction be like?
- What are the implications for educational technologists in colleges?

After defining "new paradigm" and "systemic change," this presentation identifies major societal changes that are likely to impact on education. Then it explores the implications of those changes for education and the kinds of changes we might expect to see in schools and colleges. After presenting a general vision of an information-age educational system, it explores how methods of instruction might change to support that vision. Finally, it addresses some specific implications for educational technologists in higher education.

Pre-conference Workshops

Pre-conference Workshop 1

Investigating Portals

Presented by: Bill Wilson, Director of Instructional Technology and Training
Gettysburg College

This pre-conference workshop will take attendees into the wonderful world of portals. Gettysburg College has had their portal, CNAV, in operation for three years. We will look at the services and audiences this portal provides as well as review data collected from over 1000 users or potential users of portals to see which services they feel are most important and what they would use most. We would also investigate the local work that must be considered as a campus starts to think about a portal product. We will also have access to a number of different portal products for attendees to have hands on lab time.

About the Presenter:

Bill Wilson has a PhD in Child and Developmental Psychology from the University of Connecticut and was an early adopter of computers in the classroom during his teaching years. He has been active in academic computing since 1979 when he became Coordinator of Academic Computing at Gettysburg College. He has held many positions while at Gettysburg, and he is currently Director of Instructional Technology and Training. Bill has been involved with ASCUE for over 15 years and has presented many papers and conducted a number of workshops for ASCUE.

Pre-Conference Workshop 2

Build Database-Driven Websites Using Macromedia Dreamweaver UltraDev

Presented By: Janet Hurn, Miami University Middletown
Cheryl Reindl-Johnson, Wilmington College
Nancy Thibeault, Sinclair Community College

Do you want to add dynamic content to your Web pages without learning a complicated scripting language? Then Macromedia's Dreamweaver UtlraDev is for you! With UltraDev you can quickly and easily connect web pages to a database and create dynamic e-business web sites such as storefronts, directory listings, customer registrations, and tracking systems. UltraDev can also be used to keep your educational site more up to date. You can create web-based drill and practice applications, online quizzes, and more. UltraDev simplifies the process of developing customized web sites by automatically writing the Active Server Pages (ASP), JavaServer Pages (JSP), or Cold Fusion Mark Up Language (CFML) scripts that interact with a database to generate customized web pages that will run on any browser.

In this workshop participants will use UltraDev to create a dynamic web application that interacts with an Access database. Workshop exercises include: Basic web page formatting, UltraDev development environment, Database connections, Data source definition, Recordset creation, Write simple SQL statements, Add dynamic text to a page, Display database records, Build pages that search databases, Build pages that update database records.

About the Presenters: Janet Hurn is is a Physics Instructor and Co-Coordinator of the Faculty Summer Institute on Teaching with Technology at Miami University. She has also been co-cordinator of the annual technology fair and chair of the Retention Committee at the college. Her special area of interest is multimedia in Physics education.

Nancy Thibault is the Computer Services Manager at Sinclair Community College and the other Co-Coordinator of the Faculty Summer Institute on Teaching with Technology and annual technology fair at Miami University. Her special area of interest is Web/Database programming.

Cheryl Reindl-Johnson is the Evening College Coordinator for Wilmington College, a 4-year liberal arts institution in Wilmington, OH. She has worked in higher education for the past 14 years, and been involved in distance education and computer technology for the past 6 years. She earned her B.A. in International Business and Communication from Wilmington College in 1989, and her M.A. in Rhetoric and Composition from Miami University in 1993.

Pre-conference Workshop 3

Supporting Team-Based Instructional Design

Presented by: Carol L. Smith, Coordinator of Faculty Instructional Technology Support,
Carl P. Singer, Director of Faculty Instructional Technology Support
Julianne M. Miranda, Coordinator of Instructional Technology, School of Music
DePauw University

In today's academe, supporting faculty members' instructional design projects, especially those involving new technologies and teaching methods, often demands a team with members of wide-ranging expertise and backgrounds.... teacher, subject matter expert, instructional technologist, web designer, production manager, network administrator, assessment expert, etc. This means that team members must understand their roles and be able to work together to achieve the project goals.

This interactive workshop consists of presentations, discussions and activities through which participants will learn guidelines for managing and supporting different types of instructional design projects. It promotes a systematic approach to facilitating team projects and instructional design based on principles we have learned from case studies and several years of experience.

Topics include the stages of design and development, understanding and articulating project objectives, project management principles, roles of team members, and methods of assessment. Although we will focus on full-length projects as a point of study, we will also offer guidelines for applying these methods to walk-in consultations.

Faculty members, instructional technology support staff, and computer support staff, will benefit from this workshop. We especially welcome small teams to participate.

About the Presenters:

Carol Smith had been Coordinator of User Services and Computing Labs at DePauw University for five years when she changed her title to Coordinator of Faculty Instructional Technology Support. She spent six years at Indiana University in user support before coming to DePauw, where she is currently responsible for creating support mechanisms for all students, faculty and staff on campus. She is also part of a team which is developing a new faculty instructional support program at DePauw. Carol has presented papers and given tutorials on team-based methods for project management at two previous ASCUE Conferences.

Carl Singer has been Director of Academic Computing and Professor and Chair of Computer Science for many years. Along with regular duties, Carl has been actively involved in promoting effective and appropriate use of technology in teaching and learning. For the past several years Carl has successfully promoted the use of teams for problem solving and process inprovement. He has given workshops and consulted on team-based methods for project management at ASCUE Conferences and elsewhere.

Pre-conference Workshop 4

Mastering the Fundamentals of Photoshop

Presented by: Joanna Almasude, Fine Arts Center, Francis Marion University

Discover a cutting-edge imaging software. In just a half day, you will learn and understand the mystery of communication through graphics and images. With simple and yet powerful techniques, you will both appreciate the art of imaging and learn how to design eye-catching graphics for the web or multimedia products. In this workshop, we will cover:

1. Preparations needed (such as scratch, saving, memory) before one starts a project
2. Tools (Grids, guides, fade, CMYK, history)
3. Selection of Tools: pen, lasso, color range
4. Vignetting and soft transitions

5. How to correct images (adjusting color, fixing scratches, working with contrast and backgrounds)
6. How to add creative treatment with focus, tricks, motion blur, depth of fields, filters, etc.
7. Layer effects, options, clipping groups, modes, collaging with layer masks
8. Layering textures, live type tool, working with Postscript, working with effects such as chrome, glass, ~ plastic, lightning effects, shadows, etc.

About the Presenter:

JoAnna Almasude is a professional artist (BFA '91, MFA '93) exhibiting her digital and oil paintings, works on paper, and sculpture internationally. JoAnna Almasude has been working with digital graphic since 1990, and has been a digital designer for ARTWORK International Systems since 1998. She has developed and given many presentations, workshops and consultations dealing with various aspects of digital graphics and web based technology.

Pre-conference Workshop 5

Web Graphics and Animation

Presented by: Jim Workman, Director of Information Technology,
Dwayne Stevens, Pikeville College

This three-hour hands-on workshop will provide an introduction to Macromedia Fireworks 4, a fast, flexible image editor designed for the unique needs of Web graphics. Fireworks combines bitmap- and vector-graphics tools with HTML-generation features that make short work of complex rollovers and image slicing. Fireworks' automation tools take the drudgery out of repetitive production chores, and its GIF and JPEG export modules ensure the best image quality at the smallest file sizes. Some of the topics to be included in the workshop are: creating and editing a vector image (path tools, fills, strokes, objects, text), working with pixel-based images, optimizing graphics, slicing images, importing and exporting, image maps, rollovers, and animations. In addition, you will find out how Fireworks integrates seamlessly with all your favorite Web application tools including Macromedia Dreamweaver, Flash, and Adobe Photoshop.

About the Presenters:

Dwayne Stevens is the Webmaster at Pikeville College. He has been at Pikeville for four years now and this is his second year at ASCUE. Dwayne presented a paper at last year's conference and is for the first time presenting a workshop.

Jim Workman is the Director of Information Technology at Pikeville College. He has been at Pikeville for five years now and this is his fifth year at ASCUE. Jim has made presentations at the past two conferences and this is his first time as being a workshop presenter.

Microsoft Project 2000 – Keeping Projects On Time and Within Reasonable Budget

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Introduction

Microsoft Project 2000 is a software tool that supports project management, such as installing a new computer system or major construction project. It offers an organized, secure method of managing a detailed project. It can be used as a stand-alone tool or be used collaboratively by a group if set up on a web server. If one uses other applications as a point of reference, MS Project is part database (tracks activities or tasks), spreadsheet (tracks and recalculates costs and dates), charting tool (produces several different types of charts) and report writer.

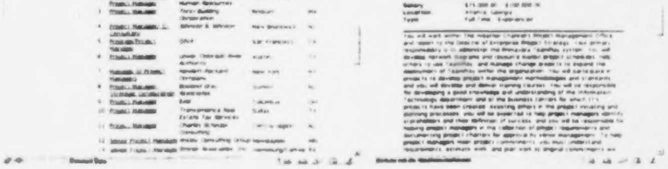
This paper and presentation will present some background information on project management concepts as well as presenting detailed information on the use of MS Project.

Project Management Industry Groups/Certifications

The leader in project management support is a user developed and supported industry group – The Project Management Institute (PMI). PMI establishes project management standards, provides seminars and educational programs, and oversees professional certification. A very useful guide that PMI publishes is the Project Management Body of Knowledge (PMBOK); the PMBOK 2000 edition was recently approved by ANSI as an American National Standard. The industry certification is a Project Management Professional (PMP). Also available, though not as impressive as the PMP certification, is the MOUS certification in MS Project 2000. The PMI website is a treasure-trove of information about project management and can be accessed at http://www.pmi.org/.

Project Marketplace – Job Outlook

PMI provides a free career headquarters resource. It regularly displays over 50 current project management jobs across the country, with compensation levels of $60,000+ annually. A few of the jobs listed are detailed at right.



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Project Management Software

Is Microsoft Project the only software available for project management? Definitely not, but it is one of the most popular, perhaps due to three factors:

- Cost
- Compatibility
- Usage Information and Support

Other products are available and are summarized in the table below. They are listed in alphabetical order – many product reviews can be found on these at http://www.zdnet.com.

Vendor	Product	List Price	Web Site
Business Forecast Systems	Forecast Pro XE	$995	http://www.forecastpro.com/
Microsoft	Project 2000	$499 $199 (for clients)	http://www.microsoft.com/office/project/default.htm
Palo Alto Software	Business Plan Pro 4.0	$99	http://www.paloaltosoftware.com/
Primavera	SureTrak Project Manager 3.0	$400	http://www.primavera.com/
Scitor	Project Scheduler 8	$600	http://www.scitor.com/default.htm

Defining a Project

The project should be well defined, including describing the project, when it should be completed, and any cost factors. For example, "Install JD Edwards GL Module" is too general, without any guidelines. "Install JD Edwards GL Module, with implementation to be completed by January 1 for $50,000" is more specific and measurable.

Using MS Project

We will use a three-pronged attack to build our project using MS Project – 1) build a project 2) track and manage the project and 3) close a project. Most of this paper and presentation focuses on the first task, building a project. Each of these major categories will have sub categories and steps within it.

MS Project Basics

MS Project 2000 has the same look and feel as other MS applications, reducing your learning curve on some of the basic tasks. However, project management concepts are foreign to most so this may be your biggest learning curve.

Starting a New Project – Views and Defaults

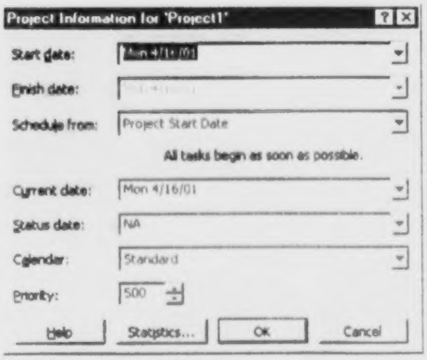
MS Project starts with the default view – Gantt Chart, but there are 23 possible views to utilize. The most common views are represented as icons at the left side of the screen. These views can be categorized as:

Graphical	Gantt Chart, Network Diagram, Calendar
Task Sheet or Table	Entry Table, Cost Table, Schedule Table, Summary Table, Tracking Table, Variance Table, Work Table
Form	Task Details, Task Name

Double clicking on a view will change to that view; an alternative method is to use the View menu. We will deal with the most common views, Gantt Chart, Network Diagram, Calendar and Task Usage.

Before adding any project information, check out and change any project default values. This can be accessed by clicking on **Project, Project Information** menu selections.

1. The start date will be today's date – you should click on the drop down arrow and select a new start date from the calendar.
2. The finish date will be automatically calculated from the tasks as entered.
3. The schedule from selection box lets you schedule from today (start date) forward or chose a finish date and schedule back.
4. The Calendar box can be standard, night shift, or 24-hour shift.
5. Click the OK button once you have entered all of your options.



Start date: Mon 4/16/01

Finish date:

Schedule from: Project Start Date

All tasks begin as soon as possible.

Current date: Mon 4/16/01

Status date: NA

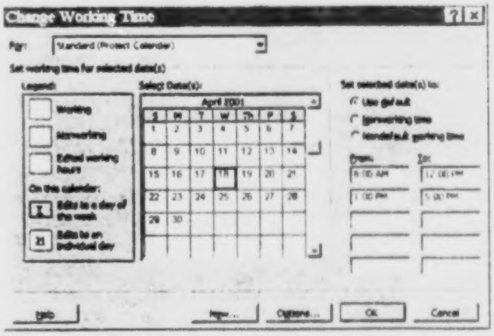
Calendar: Standard

Priority: 500

You will also want to set up project calendars for the entire project and, if necessary, for individual resources or tasks. Holidays and other nonworking days can be specified, as well as different working hours.

To work with the project calendars:

1. Click Tools on the menu bar, and then click Change Working Time.
2. Chose the correct calendar in the For drop down box.
3. Select the appropriate month by using the scroll arrows.
4. Click on a date to be marked as nonworking.
5. Click on the radio button for nonworking time.



For: Standard (Project Calendar)

Set working time for selected date(s)

Select Date(s):

April 2001

S	M	T	W	Th	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

Set selected date(s) to:

● Use default

○ Nonworking time

○ Nondefault working time

From:	To:
8:00 AM	12:00 PM
1:00 PM	5:00 PM

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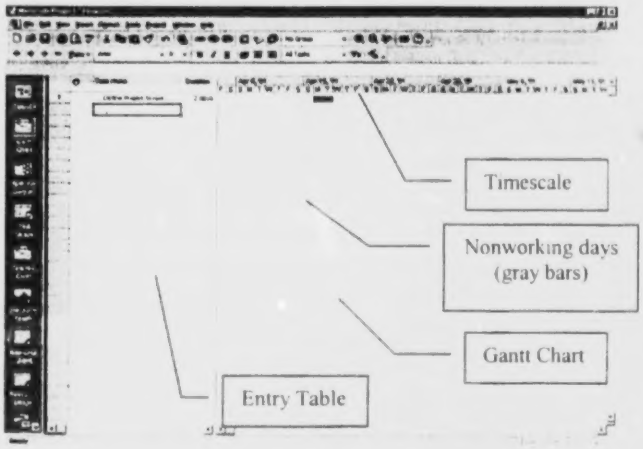
6. Any other modifications can also be made to time, etc.
7. Click on OK when complete.

Planning/Adding Tasks

Activities or tasks that must be completed in order to finish the project have to be identified. Sufficient detail must be listed without becoming too detailed. For example, train users may be OK as a task if training is general and similar for everyone. However, if training is split into training for accounting vs. training for the rest of the users, these should be listed as separate tasks. Duration must also be assigned to all tasks as well. The default unit of measure is days, although this can be changed to hours, or several other units of measure.



Tasks are entered in Gantt Chart View:

1. Click on the Task Name Cell and enter a short, but descriptive task name.
2. Press the right arrow key or click on the duration cell. The task duration should be entered as a number, which will default to days. If you want weekly, follow the number with a w or an h for hourly.
3. Click the task name cell in row 2 and enter the next task and duration. Enter all of your tasks.
4. Click the Save button on the Standard toolbar. Select the drive and folder location. Type a filename in the File Name text box.
5. Click on Save. Note that your file will be saved as filename.mpp. When asked, click the save without a baseline. (Baseline is not usually created until the entire project has been entered and everyone has reviewed and approved it.)

Tasks can be inserted into the list by clicking on the task where you want to insert, and then pressing the insert key. Tasks may be deleted by clicking on a task and pressing delete.
You can save time in entering tasks by copying and pasting existing task (follow Select and Do procedures). In addition, recurring tasks can be set up.

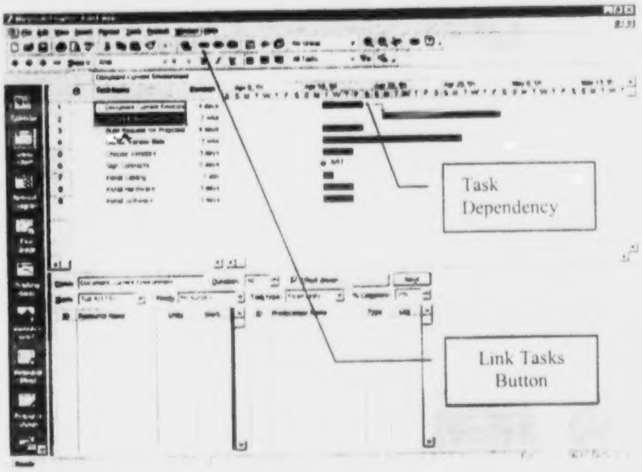
To set up a recurring task (for example, a meeting that meets every week):

1. Click an empty task name cell, and click on insert on the menu bar. Then click on Recurring Task.
2. Complete the Recurring Task Dialog Box and click OK.

Drag the split bar separating the Entry Table from the Gantt Chart to the right so that you can see the additional entry fields. Note that the Start Date is assumed to be today's date; the finish date will be automatically calculated, and that we will enter the predecessor tasks and resource names at a later point.

Establishing task dependencies requires that one understand the four types of dependencies. Dependencies establish relationships between tasks in a project and help determine when a project will be completed. The first task in a relationship is called the predecessor task; the second task is called the successor task. The most common type of dependency is Finish to Start (FS); the predecessor task must finish before the successor task can begin.

Finish to Start	FS	First task must finish before second task can start.
Start to Start	SS	First task must start before second task can start.
Finish to Finish	FF	First task must finish before second task can finish.
Start to Finish	SF	First task must start before second task can finish.

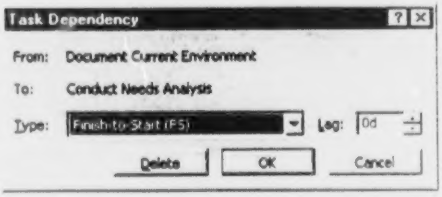


Open your project in Gantt Chart view:

1. Select Windows, Split Screen to split your screen another time to show task dependency detail.
2. Click on the first task in the relationship, and then drag to the second task in the Entry Table.
3. Click on the Link Tasks button on the standard toolbar.

Another way to link tasks is using the Gantt Chart itself:

1. Point to the middle of the first task. The pointer changes to a 4 headed arrow.
2. Click and drag the link pointer in the bar to the middle of the second task.
3. To modify the type of relationships between tasks, double click the link line between the two tasks. Use the dialog box (at right) to modify the dependency.



From: Document Current Environment
To: Conduct Needs Analysis
Type: Finish-to-Start (FS)
Lag: 0d

Note that dependencies can also be established in the network diagram view and the calendar view. The procedure is similar to the Gantt Chart method – point to the middle of task and click and drag to the second task.

Deleting a dependency is accomplished by selecting the tasks, and then clicking the unlink tasks button on the standard toolbar.

The drag and drop methods described above work well for dependencies that are one for one. When one task is a predecessor for many tasks, then it becomes very difficult to accomplish this graphically. The Gantt Chart split screen we invoked above allows one to enter the relationships in a table layout.

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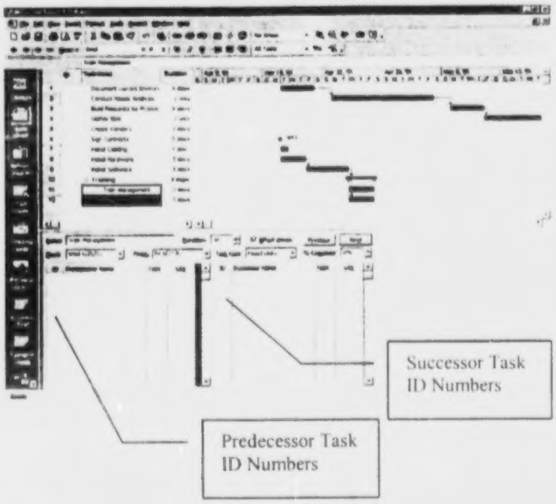
To establish dependencies using the Table:

1. Click on the task in the Entry Table that you want to establish dependencies for.
2. Right click on the table at the bottom of the screen, and click on Predecessors & Successors.
3. Type in the predecessor task numbers in the ID column.
4. Tab to the successor task ID column and type one or more successor task number(s).

Note that the type of task relationship (FS, SF, etc.) can be edited here.

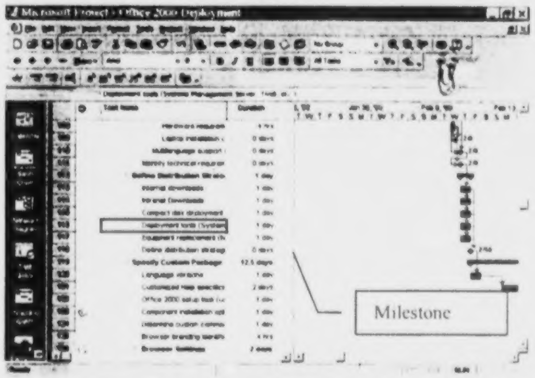


Milestones

Milestones are symbolic tasks that represent the end of a significant phase of a project. They serve as minor triumphs for the project team and morale boosters. The project manager identifies strategic points in the project, including points early in the project, where extra motivation may be needed. A milestone has duration of 0, which MS Project recognizes then as a milestone.

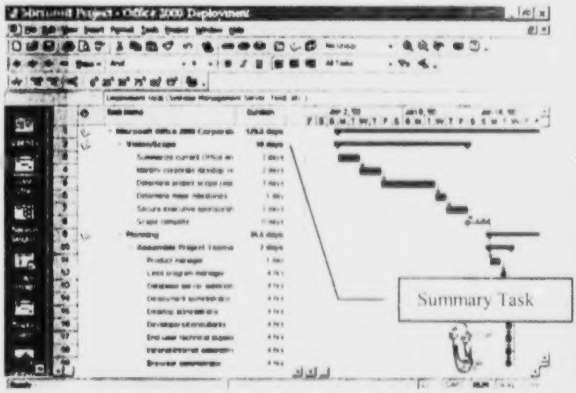
Establishing milestones:

1. Click on the Gantt Chart to select it (if not selected).
2. Click on a task in the entry table, above which you want to establish a milestone.
3. Press the insert key to insert a new line.
4. Type the milestone task name.
5. Press tab and enter a duration of 0.



Grouping Tasks/Summary Tasks

Large projects often contain many tasks; it is prudent to organize the tasks into subgroups to better manage the project. Tasks are grouped logically under summary tasks. The rule of 20s indicates that you create no more than 20 summary tasks and then break those down into individual tasks until you have defined the entire project.



To establish summary tasks:

1. Click on the first task to be in the summary/group.
2. Press the insert key, and type the summary task name.
3. Select (drag across) the tasks to be included in the group.
4. Click on the indent button on the formatting toolbar.

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The task is now a summary task and listed in bold. The summary task has a predetermined duration that is the total of all the sub tasks. The Gantt chart displays a summary task bar over the grouped tasks.

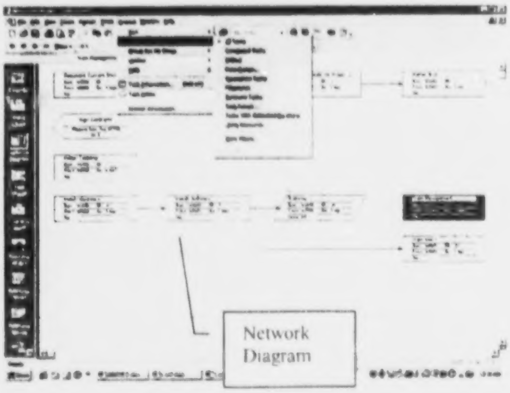
Analyzing the Critical Path

The critical path consists of the tasks and durations that determine the shortest time to complete the project. The Network Diagram is the MS Project view that shows critical path (in red). To manage and keep the project on track, the project manager must have skills in managing the critical path and tasks. MS Project provides three tools to allow you to analyze the network diagram and critical path. These tools are filters, formats, and special presentations of the Network Diagram.

Using filters:

1. Select Network Diagram from the View bar.
2. Click on Project, Filter, and one of the filters. Note Critical is one of the popular filters. Only critical tasks will be displayed or filtered.

Custom filters will let you filter on more than one criteria at a time. Formatting (changing fonts, font size, font effect or font color) lets one visually set apart critical tasks, for example.



Crashing the critical path involves shortening the amount of time it takes to complete a project. It can be "crashed " by changing task information or by applying additional resources to tasks on the critical path. These methods are summarized in the list below. Project Managers must be careful to change things realistically; it must be achievable in real life and not just on paper.

1. Shorten task durations for critical tasks.
2. Delete finish to start (FS) dependencies between two critical tasks.
3. Change finish to start dependencies (FS) between two critical tasks to start to start (SS) or finish to finish (FF) dependencies.
4. Add negative lag time to a finish to start (FS) relationship between two critical tasks, thereby allowing the tasks to overlap.
5. Modify the calendar on which the task is based to expand the available working time.
6. Eliminate date constraints, especially those that require that a task start on a particular date.

Adding Resources

Significant project management effort is expended on assuring that project cost is controlled. MS Project provides a Resource Sheet for cost and resource information to be entered. A resource is the person(s), material or equipment to be used in completing project tasks. Resources must be defined prior to being assigned to tasks.

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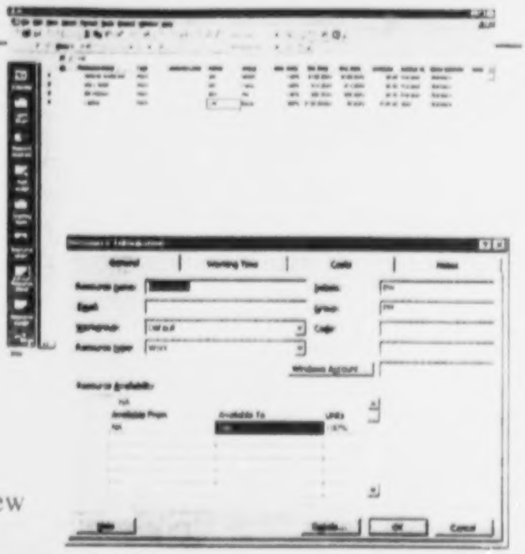
To define resources:

. Double click on the Resource Sheet button on the View toolbar.

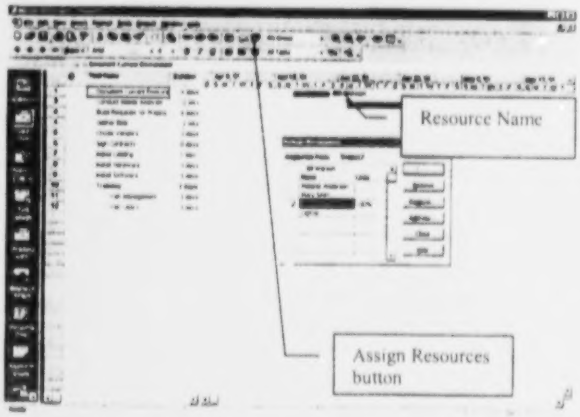
. Enter the resource name and press tab to complete the rest of the fields on the worksheet.

3. Double click on a resource to open the resource information dialog box and change resource availability, working time, and costs.



To assign resources to tasks:

1. Click on the Gantt Chart view on the View toolbar.
2. Click on the Assign Resources button on the standard toolbar. A dialog box will open.
3. Click on the task in the Entry Table, and then click on the resource in the Assign Resources dialog box, and click Assign.
4. The resource will now have a check mark beside it. In addition, the resource name will appear on the Gantt Chart.



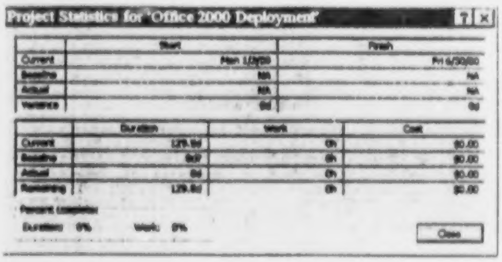
Tracking a Project

Once all the tasks are entered, dependencies assigned, resources assigned, and project reworked, crashed and manipulated, it is time to save a baseline project. Then you will be able to assign actual data to the project. The baseline or budget can then be compared to the actual results of the project.

A baseline can be established after all tasks are entered, all relationships established, and all resources entered and assigned. Approval of the project plan should be obtained by management, and to the extent possible, by all individuals involved.

To establish a baseline:

1. Check project statistics by clicking on Project, Project Information. Then click the statistics button in the Project Information dialog box.
2. Click close on the Statistics dialog box. If you are satisfied with the project status, proceed.
3. Click Tools on the menu bar, then point to Tracking, and click Save Baseline.
4. Click OK to accept the defaults.



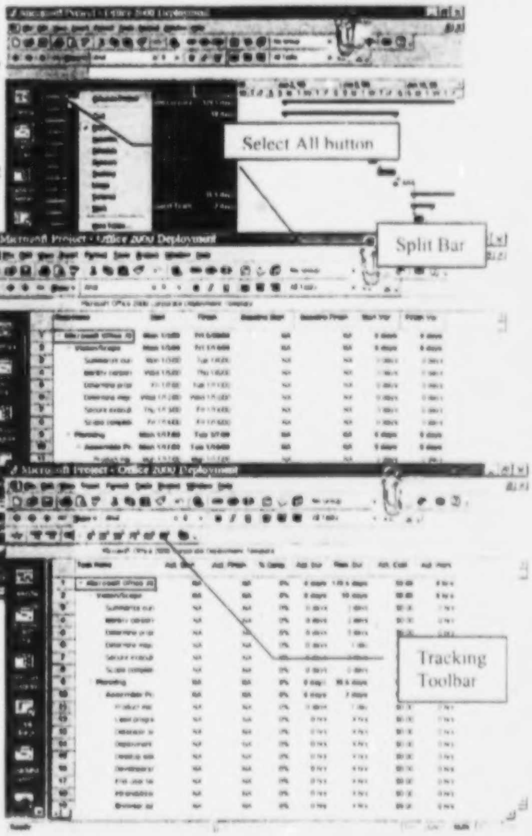
Project Statistics for 'Office 2000 Deployment'

	Start	Finish
Current	Mon 1/3/00	Fri 6/30/00
Baseline	NA	NA
Actual	NA	NA
Variance	0d	0d

	Duration	Work	Cost
Current	[illegible]	0h	$0.00
Baseline	0d?	0h	$0.00
Actual	0d	0h	$0.00
Remaining	[illegible]	0h	$0.00

Percent Complete:

Duration: 0% Work: 0%



To view the baseline data:

1. Right click the Select All button for the Entry Table in Gantt Chart view.
2. Click Variance.
3. Drag the split bar to the right to display all the columns of information.

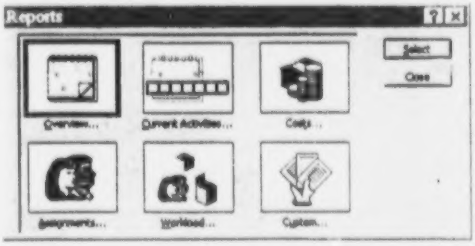
To track progress, you must display the tracking toolbar:

1. Right click any toolbar, and click Tracking.
2. The Tracking Toolbar will display.
3. Right click the Select All button on the variance table, and click Tracking.

You can enter actual values for tasks by using the fields displayed; however, the icons on the tracking toolbar will speed up the process.

Closing a Project

Closing a project is not a function of MS Project, but rather a point in time when the project is completed and the project manager proceeds to close the project by printing final reports. This assumes that all tasks are complete. A meeting may be scheduled to do a post-mortem on the project and its successes and failures.



The reports that may be printed at the close of the project are the Project Summary, Top-Level Tasks, Milestones, Completed Tasks, Budget, Task Usage, and Resource Usage. These reports are printed from the **View** menu, then click **Reports**, and then **double click the reports** you want to print.

Conclusion

MS Project is a useful tool for managing projects. It does require some time to learn to use and properly apply, but the time invested may prove very beneficial in keeping a project on time and under budget.

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Add Streaming Media for the Web to Your Technological Toolkit

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Abstract

Many of the effective pedagogical tools I have implemented have been introduced to me through conference papers of a tutorial nature. If the learning curve of a tool is so demanding that it takes many weeks or months of learning, and many hours to produce a very short learning experience, then I am typically not interested in adding it to my technological tool kit. I often burn out long before any benefits are realized.

Features that I consider essential are that the new tool be:

- **Easy** to obtain/Install
- **Easy** for the developer to use
- **Easy** for the audience to use
- **Easy** on everybody's pocketbook
- **Effective** for developing learning/teaching tools

The tools I present at this session can be learned in less than an hour, and when you return home, you can download and install the tools in less than an hour. You can then immediately begin to create a narrated streaming slide show right in PowerPoint.

In this tutorial session, we will demonstrate how to download the necessary software, how to use RealPresenter (the FREE version) to create a streaming narrated PowerPoint slide show. We will then learn how to edit such a presentation. We will then play the final product using RealPlayer (the FREE version.) We will also discuss some tips/tricks to use in PowerPoint before the narration is added such as imaging, drawing tools, and animation options. We will also discuss the RealPresenter techniques to make more effective streaming media presentations. We will learn how to "publish" such a file onto a RealServer machine. With less than one hour of training, you should be able to return and implement these tools immediately.

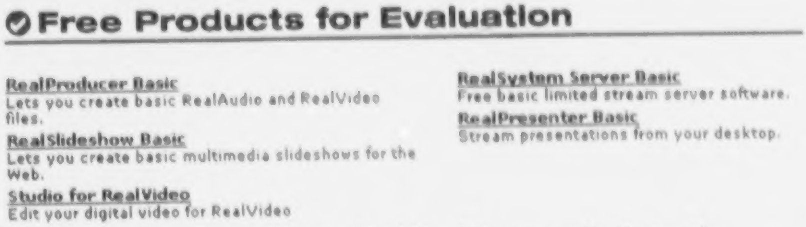
If you are a neophyte and want to create narrated slide shows for the web which use streaming technology so that download time is cut way down, then this session is for you.

Introduction

I have been developing multimedia-learning materials for in-class and stand-alone use utilizing presentation software for quite a few years. I then turned my attention to the creation of on-line learning resources. With limited bandwidth preventing the timely download of large multimedia files, I realigned my efforts away from multimedia presentations when developing on-line materials. Unless the audience was on campus to take advantage of local network connections, the benefits of multimedia presentations were almost always heavily outweighed by the cost in time and effort to download and view the presentations. As wider band-width becomes more common, it seems to be time to realign my efforts to multimedia files which can take advantage of "streaming" technology which allows files to begin running before the downloading has been completed. As I explored products that would help me to develop such materials on a limited budget (zero is a definite limitation!), I came across a product distributed by **REAL™** which fits the four "Easy" and one "Effective" requirements (described above) I look for when evaluating development tools. While I normally do not push one product over another when possible, this product may well be in a class by itself, especially considering that the Basic version I describe in this paper is distributed free of charge.

RealPresenter Basic

Visit the following web site:
http://www.realnetworks.com



Free Products for Evaluation

RealProducer Basic
Lets you create basic RealAudio and RealVideo files.

RealSlideshow Basic
Lets you create basic multimedia slideshows for the Web.

Studio for RealVideo
Edit your digital video for RealVideo

RealSystem Server Basic
Free basic limited stream server software.

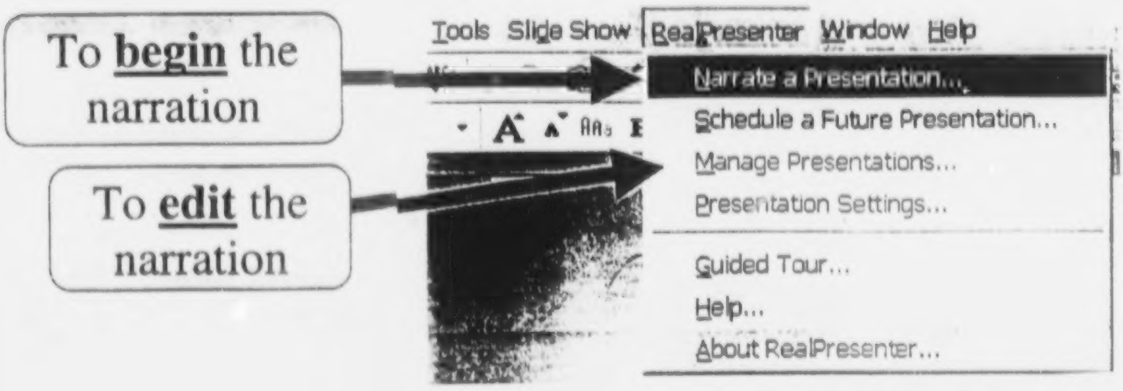
RealPresenter Basic
Stream presentations from your desktop.

Locate the link near the bottom of the site that allows you to download RealPresenter Basic (or the "Plus" version if you are ready to spend under $200—check for academic pricing.)

The downloaded file is a self-installing executable file which, when double-clicked, will install the software and the supporting files necessary to create and play "streaming PowerPoint slide shows" for on-line or off-line use. The minimum system requirements, as described on the web site are listed as:

- A. 300MHz Intel Pentium II processor or equivalent
- B. Free RealPlayer 8 Basic (recommended) or RealPlayer 8 Plus
- C. Platforms: Windows 95, 98, 2000, NT 4

After installing the software, the next time you open PowerPoint, you will notice that there is a new RealPresenter menu item setting on the PowerPoint menu bar as seen in the following screen shot.



The PowerPoint presentation must already be created and open (and should be saved) before you attempt to narrate it. There are definite techniques that should be used when creating the PowerPoint slide show before RealPresenter is "applied." The following PowerPoint guidelines are suggested:

- Be certain all fonts are slightly larger than you would normally use since the viewer may opt to view the "show" in a small window. I suggest a minimum 32 point font
- Do not utilize script of handwriting-shaped fonts as they are typically much harder to read, especially if the viewer opts a smaller window when viewing the streaming show
- Do NOT use any "fancy" transitions since the ONLY transition RealPresenter uses is "Appear" and any transition will be converted once RealPresenter is applied
- I have the Title of a slide show up without any transition since I do not want the user to have to wait at all to see where the next slide is headed
- DO utilize transitions on bullet lists where they "wait for a mouse click" to proceed. This way, when YOU are ready to transition your narration to the next topic, YOU will control when the text appears
- Do NOT use animated images, since movies and animations transition into still images when RealPresenter is applied.
- Use graphics to enhance the learning (not just the "looks") and freely utilize the drawing capabilities of PowerPoint so that arrows, specialty text boxes, and any imported images become "alive" as you narrate the slide. Remember that EACH object can be separately transitioned. Also take advantage of the "group" option where objects can be simultaneously chosen (use the shift-key while clicking on them) and then grouped into a single image
- Utilize scanned images and screen shots freely (assuming you are within "fair use" guidelines) as they greatly enhance learning beyond a "simple bullet list" presentation. This is especially effective for any class involving labs or where lots of visualization is important in the learning process. Do not limit yourself and your audience to clip art!
- If you include graphics, figures, or screen shots on a slide combined with text and you want the image to appear part-way into the slide, then be sure to break the text into two text boxes so as the first text box is completed, the image transitions onto the screen, followed by the second text box.
- Be absolutely sure that **EVERY** transition, color, spelling, image, drawing, background, etc. is letter-perfect in PowerPoint BEFORE you ever attempt to apply RealPresenter. Once you have created the narration, you can NOT change transitions, spelling, etc. without losing the entire first narration attempt. You may, of course, edit the original PowerPoint presentation, then double-check it, then redo the narration from scratch!

The session will feature a LIVE editing session where the presenter will take a PowerPoint slide show that has already been created, make the appropriate transitions to optimize the narration process, and then create a "first draft" streaming narrated slide show utilizing RealPresenter™. We then will edit the narration, demonstrating how best to isolate individual narrated "thoughts" so the editing is separated while the resulting product is "fluid" and with few interruptions or dead spaces. By the end of this session, you should be able to return to campus and download the product, install it, and create your first streaming narrated slide show within a few short hours. If you are a neophyte to streaming audio/video and if this is the type of learning curve you can live with, then this is the session is for you.

Distance Education for Technology Related Courses

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In the fall of 1999, the Printing Management program tested an idea; could a traditional lab based course be taught via distance learning?

The integrity of the introductory course for Printing Management was a concern, so several conditions were outlined for the distance learning class to meet. The students at the distance learning site were required to complete the same laboratory assignments and have the same experiences as the on-campus students. The instructional preparation could not be extensive like preparing a new course. The challenges were difficult but not insurmountable. What follows will describe the motivation to try this, the implementation of the course, the challenges faced with this model and lessons learned.

The Problem

The Printing Management program had identified several issues that could be viewed as either challenges or roadblocks. There was the need for program growth in terms of majors, the printing industry and the Printing Management program had low visibility as a career choice, the traditional pool of students in a high school technology are not college bound and there was little time on faculty schedules to add new tasks.

Common Solutions

Recruiting and visibility issues have commonly been addressed by aggressive advertising/recruiting campaigns. New product literature can be developed which when tied with an effective mailing and planned visits to high school graphic arts programs can generate new interest in printing management as a career. However, the problem is finding time to manage more recruiting and visits. Another solution needed to be found.

Distance Learning for Technology Based Disciplines

Georgia has over 450 distance learning sites in high schools, colleges and universities across the state, Georgia Statewide Academic and Medical System (GSAMS). How can Printing Management take advantage of a technology that sits next to one of its classrooms?

Georgia also has the Post Secondary Option (PSO). The PSO allows qualifying high school students to enroll in a post-secondary course offered by a college or university and receive both high school credit and the college credit. Other states may have similar programs.

Printing Management could teach its Introduction to Printing Technology or Desktop Publishing courses as a PSO course to high schools using distance learning. This model would solve many problems. With a little extra course preparation for distance learning, faculty can be both on campus and off campus at the same time. Teaching a course now becomes recruiting. To enter a PSO course the high school must be able to be admitted to the University as a regular student. Now the high school target audience is college bound.

Choosing the Technology

Surveying the possibilities for distance learning created a rather short list of viable choices. The internet provided two possibilities: 1) traditional web page development or 2) WebCT. Teleconferencing from Georgia Southern University provides only one choice, GSAMS. GSAMS was chosen because it required the least amount of lesson redesign, faculty could teach both classes at the same time, instruction is interactive, and the room and technology for distance learning is in the Technology building.

Implementing the Plan – Offering the PSO Course

Step 1 – Get approval on campus

This was a relatively easy task to accomplish. GSU has put great effort and resources into developing and promoting distance learning. In the College of Science and Technology, math, biology and physics have already offered some of their non-lab classes via distance learning. The administration was very pleased to support the expansion of distance learning offerings.

Step 2 – Getting into a public school

Since this was a first for the program, several decisions needed to be made about which high school teachers and programs will be appropriate as educational partners. In Georgia, many high school printing programs have been accredited by PrintEd. (high school graphic arts certification). This would be one of the first criteria along with teacher reputation and breadth of technologies in the program.

McIntosh High School in Peachtree City, Georgia was selected as the beta site for the distance learning. The printing program is PrintEd accredited, the faculty is nationally recognized by International Graphic Arts Education Association and the program has the technology and facilities for all but one printing process.

Step 3 – Meeting with school administration

To make this happen, a direct meeting with the people who can make decisions is a key to success. The Printing Management faculty had a meeting in late May with the principal, vocational supervisor, distance education coordinator and the instructor. After presenting the details of the class, the school's administration were able to approve and immediately plan the course for the coming fall semester.

The Courses

In the fall, the Introduction to Printing Technology was taught. It had thirty students on campus and another thirteen at the high school. The telecommunication connection was only needed for lectures. Lectures were scheduled on Mondays and Wednesday s, while Tuesdays and Thursday s were lab days.

The introductory course teaches printing technology related to 35mm photography, process photography, digital photography, scanning, image editing, lithography, flexography, screen printing and bindery. On lab days, the students at the high school would attend the school's printing lab and the teacher acted as lab facilitator. All lab assignments and instructional materials were provided. The high school provided the lab's supplies except for the flexography plates. Flexography was the one process that could not be totally completed at the high school. For this, the flexography plates were sent for processing and returned to Georgia Southern for printing.

The high school needed to schedule course for the full academic year, so in the spring the Desktop Publishing course was taught. The coordination between the two schools for desktop had to do more with the software than the hardware. Sixteen students total attended the class: eight were at Macintosh High school and eight were regular Georgia Southern students on campus.

Desktop Publishing class was a basic, point and click introduction to the technology. Lecture and lab topics included designing, creating and assembling products for both print and electronic (internet and multimedia) media. Both lectures and lab demonstrations were delivered from the Georgia Southern University's distance learning classroom to the students at the McIntosh site. The facilitator used instructor prepared learning packs to help facilitate the lab activities.

Problems

There was little participation on either side of the televisions. Students seemed to be intimidated by the technology. On Georgia Southern's side of the connection students had microphones on each desk and had to push and hold the button when they wanted to speak. The high schools microphones were always on, so background noise was a problem when teaching. The volume was turned down which meant that for a student to speak, they had to ask for the volume to be turned up first.

Although instruction did not have to be developed from scratch, there was still much time spent making existing instruction fit the new delivery format. The distance learning media was 36" television monitors. These were a relatively small format for instructional delivery. The distance learning classroom also included interactive microphones for both the students and the faculty, PowerPoint and internet capable computers, electronic white boards, VCRs and an Elmo. For the video display, the minimum font size was 24 point on screen with 30 being better. This caused many of the presentation materials to be redesigned.

The coordination, grading and feedback of tests proved to be a problem for the high school site. Time was the greatest obstacle after the test was given. The tests needed to be mailed Georgia Southern, graded and then returned for review.

Enrolling in a university course while still in high school prevented the high school from approaching the completion of assignments in a manner consistent with university students. The high school instructor often attempted to insulate students from the pressures of the university courses.

Evaluation

It worked. Most of the initial desired outcomes were realize with the long term less successful. The course raised visibility both on and off campus. No students entered the Printing Management program from this first experience.

Lessons Learned or What Next

To be able to offer this course, the high school teacher's schedule was changed which caused a lower enrollment for her first year course. The could be solved by providing funding to the teacher as a facilitator of an extra course.

As contacts are made to expand the offering to other schools several things become apparent. Universities' obsession with very early course planning is needed long before high school think about the next year's plan. Not as many high school printing programs are as diverse as the first one chosen, which makes offering the Introduction to Printing Technology problematic, however, the Desktop Publishing course seems to be a common element to most programs. Finally, the meeting with school administration is crucial because telephone conversations are not producing results.

Faster feedback on tests, and certain written assignments could be resolved (enhanced) by increasing the use of the internet classroom, and specifically WebCT. In the case of these classes, the short time frame we had to prepare for these classes eliminated the feasibility of using WebCT.

Outcomes

Increased visibility, developing a working relationship with high schools, and exposure of "what we do" to a new audience of students and administration were all positive outcomes. For the short term, we did not get any new students into our program, However, one student had decided to come to the Printing Management program, but did not because his parents moved out of the state.

Student Evaluations

For the Desktop Publishing class, the PSO students received a higher final grade than did their GSU campus counterparts. In the two segments of the class (lab and lecture) the PSO students had higher averages than the GSU students.

Personal Knowledge Management: Framework for Integration and Partnerships

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Abstract:

Two central issues in the undergraduate curriculum are the disjoined relationship between general education and the majors, and the coherence of a technology integration model. The framework of Personal Knowledge Management (PKM) has been developed by the authors as a vehicle for dealing with both of these central problems and developing a sense of personal responsibility. The PKM framework emphasizes learning-to-learn information skills: retrieving information, evaluating information, organizing information, collaborating around information, analyzing information, securing information and presenting information. These information skills underlie an effective strategy for integrating information technology into the curriculum rather than focusing on technology as an end in itself. The PKM framework emphasizes technology as integral to the inquiry and problem solving processes that are fundamental to both general education and academic majors. In their paper the authors develop the Personal Knowledge Management framework as the grounds for a genuine partnership between faculty teaching general education and major courses.

An Introduction to Personal Knowledge Management

The framework of Personal Knowledge Management (PKM) has grown from a series of discussions among a group of Millikin University faculty from diverse disciplines and backgrounds seeking to build a cross-disciplinary approach that integrates elements of both critical thinking and information literacy. The initial framework for PKM was developed by Dr. Paul Dorsey and was further defined and conceptualized through a Faculty Seminar at Millikin University in summer 2000 and through a small working group of faculty meeting regularly during the 2000-2001 academic year. This group, which consists of faculty from the humanities, natural sciences, business and library science, has focused on the cross-disciplinary nature of inquiry and problem solving. The work of this group suggests that inquiry and problem solving skills share common threads that span the disciplines despite superficial differences. PKM, which aims to bridge both general education and the disciplines, promises to provide us with both a common language and a common understanding of the intellectual and practical processes necessary for the acquisition of information and its subsequent transformation into knowledge.

Information literacy and critical thinking are two other frameworks in higher education today that seek to provide shared moorings for inquiry. These are more than buzz-phrases making their way through our campuses; they are crucial skills required for successful problem solving in the twenty-first century. The exponential increases in information available dictate that we change our approaches to both the gathering and use of information and the subsequent transformation of that information into knowledge. How does this relate to information literacy and critical thinking, and how does inquiry and problem solving fit into this equation?

In The End of Patience David Shenk notes: "We must not confuse the thrill of acquiring or distributing information quickly with the more daunting task of converting it into knowledge and wisdom. Regardless of how advanced our computers become, we should never use them as a substitute for our own basic cognitive skills of awareness, perception, reasoning and judgment."[i] Technology has given us the ability to both access and retrieve volumes of information that would have been unthinkable just 10 years ago. Since 1992 the use of information in print formats has decreased between four and six percent, while at the same time the use of the Internet has grown 2050%. We need a framework that will help us effectively address these issues. We believe that Personal Knowledge Management provides us with that framework.

We believe that the information literacy and critical thinking movements have made positive contributions to the search for common grounds in inquiry. Information literacy, by focusing on the central role of librarians and information resources, has helped to focus on the information skills that will underpin inquiry in the twenty-first century. At the same time, the information literacy movement, while emphasizing skills in retrieving, evaluating and organizing information, has placed less emphasis on collaborating around, securing and presenting information. The critical thinking movement, by focusing on the central inquiry skill of analyzing information, has promoted an ecumenical approach to inquiry. However, that approach has also neglected the collaborative nature of inquiry and the skills in securing and presenting information that are central to PKM. We believe that PKM provides a framework that is both comprehensive and inclusive. It also enables us to link our technology tools with a set of information skills, thus providing an intentionality that moves the focus from the technology more directly to the information.

The term knowledge management was first used by management guru Peter Drucker in the mid-1980s. This concept focused on measuring an organization's intellectual assets and adding value and meaning to its information by asking questions such as: What do we (the organization) need to know? Who knows it? Who needs to know it? How can the people who need this information access it? Knowledge management provides a framework for sharing organizational information.

Subsequently, in the mid-1990s, the term Knowledge Management took on a new meaning through the development of computer applications that provide a means of organizing and accessing the information within an organization. In this paper, we are not focusing on knowledge management in this sense. With our framework of Personal Knowledge Management, we are extending Drucker's vision by focusing on how his "knowledge workers" become more effective learners at the individual level. In our view, technology within PKM is a means—albeit a potentially powerful means--to an end within inquiry, rather than the end itself.

Using PKM requires that we clarify the distinction between data, information and knowledge. We agree with Peter Drucker that information is "data endowed with relevance and purpose." But at what point does information become knowledge? We believe that information must have focus and relatedness to become knowledge; it is especially the significance and value of information that makes it knowledge. We agree with Davenport and Prusak who argue that for information to become knowledge, "humans must do virtually all the work" which entails activities such as comparing, exploring consequences, making connection to other information and knowledge, and conversing with others.

It is with these points in mind that we focus on the information skills underlying effective Personal Knowledge Management, and we explore how they help to provide a framework for integration and partnerships.

Overview of Personal Knowledge Management

Personal Knowledge Management is best viewed as based on a set of problem solving skills that have both a logical or conceptual as well as physical or hands-on component. These are skills that will be required for successful problem solving knowledge work in the twenty-first century. Teaching PKM entails sharing both intelligent practices that guide the use of tools as well as intelligent and efficient use of the tools themselves.

We have identified the following seven PKM skills: (1) retrieving information; (2) evaluating information; (3) organizing information; (4) collaborating around information (5) analyzing information; (6) presenting information; and (7) securing information. Each of the seven is briefly summarized below. The focus is on clarifying the processes involved in the proper exercise of each skill with a brief reference to implications for technology integration at the end of the summary.

(1) **Retrieving information.** Retrieving information involves gathering information not just from print and electronic sources, but through experimentation and oral inquiry, as well as a broad range of more discipline-specific techniques. Capabilities required range from the low-tech skills of asking questions, listening, and following up to skills in using search tools, reading and note-taking. Concepts of widening and narrowing one's search, Boolean logic, and iterative search practices are an important part of the effective exercise of this PKM skill as are social skills required for more effective oral inquiry. Also, as the literature on information literacy emphasizes, considerable effort should be placed on framing inquiry even before information retrieval commences. The effective use of Internet search engines and electronic databases in the inquiry process requires technology skills as part of the repertoire of PKM skills.

(2) **Evaluating information.** This skill is closely related to the skill of retrieving information. Strategies of information retrieval should be based on practices that select data and information that pass some evaluative tests. However, evaluation also takes place after retrieval as the quality and relevance of various pieces of information are judged as they relate to the problem at hand. We

recognize that difference disciplines tend to emphasize disparate evaluative criteria as they determine quality and relevance. The greater availability of information in the current information-rich environments makes this skill of far greater importance in the electronic age. The intelligent use of some crude electronic tools, such as "relevance raters," can be relevant to the effective evaluation of information.

(3) **Organizing information**. Organizing information is a central part of the inquiry process focused on making the connections necessary to link pieces of information. Techniques for organizing information help the inquirer to overcome some of the limitations of the human information processing system. In some ways the key challenge in organizing information is for the inquirer to make the information his or her own through the use of ordering and connecting principles that relate new information to old information. Elementary skills of synthesis and analysis are central to this process. Technological skills in organizing information have become ever more important as electronic tools such as directories and folders, databases, web pages, and web portals provide the inquirer with ever more powerful tools to make connections.

(4) **Collaborating Around Information.** The interdisciplinary literature on effective teams and groups is replete with principles for effective collaborative work. Listening, showing respect for the understanding of others' ideas, developing and following through on shared practices, building win/win relationships, and resolving conflicts are among those underlying principles. Within collaborative inquiry, partners in inquiry need to learn to have their voice heard and to hear other voices. Both cultural and more nuts-and-bolts practical issues need to be attended to. The availability of new electronic tools for collaboration to support both synchronous and asynchronous communication requires a whole new set of procedures for efficient information exchange.

(5) **Analyzing Information.** The analysis of information is fundamental to the process of converting information into knowledge. At the same time, this is the most discipline-specific information skill since the models, theories and frameworks that are central to analysis are frequently tied to the academic disciplines. Analysis builds on the organization of information, but goes beyond it in its emphasis on the importance of respect for standards in public communities. This skill addresses the challenge of extracting meaning out of data. In some disciplines, electronic tools such as electronic spreadsheets and statistical software provide the means to analyze information, but the human element is central in framing the models that are embodied in that software.

(6) **Presenting Information.** Key to the presentation of information is audience; this means, as in the case of analyzing information, that understanding disciplinary communities—often an important audience--and their norms and standards are of central importance. An effective presentation assumes not only an understanding of audience, but a clear understanding of the purpose of the presentation as it relates to audience. The history and theory of rhetoric provides an abundant literature for guidance in the exercise of this skill. The emergence of new electronic tools and venues for presentations, through computer-based presentation tools and web sites, makes attention to this information skill even more important.

(7) **Securing Information.** Securing information is frequently neglected as an information skill. However, the centrality of intellectual property issues and the multiplicity of security issues arising from the explosion of electronically networked environments make security issues more and more

salient. Securing information entails developing and implementing practices that help to assure the confidentiality, integrity and actual existence of information. An appreciation of intellectual property issues of copyrights and patents is very important. Such practices as password management, backup, archiving and use of encryption are other important elements for the effective practice of this skill in electronic environments.

These information skills are, in one sense, problem solving, rather than problem definition, skills. However, while these information skills may be used within a given context of problem definition, the processes involved in the use of these skills—especially evaluation, organization and analysis—inevitably contribute to a re-definition and refinement of the problem at hand. Problem solving is a dynamic, adaptive process. Inquiry necessarily invokes feedback and reflection that shape the very nature of the inquiry question. The PKM skills are best used in an iterative, rather than merely sequential, fashion. Inquiry frequently takes unexpected turns.

The Personal in PKM

Why is this model called "Personal" Knowledge Management? At a time when we are becoming more aware of the value of the social mind—a network of collaborative, shared thinking—why is it necessary to be concerned with the personal? Models of cognitive development and creativity continually push us to consider social contexts. And certainly, we emphasize as one of the seven key information skills the ability to "collaborate" around information. So why do we call this "Personal" Knowledge Management? What is personal about knowledge or the management of knowledge?

Let us begin by discussing things we do not subscribe to as "personal" in this model. We do not see "personal" knowledge as private knowledge intended to be learned and kept within the individual. We are not talking about "learning for its own sake." We are not assuming that learners must go through a withdrawal from community or social perspectives as a means of enhancing their "intrapersonal" communication. We do not have to withdraw from society in order to develop our "personal" knowledge or deep thinking capabilities. We are also not encouraging an artificial distinction between avocational and professional knowledge. Nor are we defining "personal" as opposed to "public" knowledge, since our model emphasizes "presenting information" as one of the seven essential PKM skills.

In fact, our concept of Personal Knowledge Management assumes a strategic balancing of the private and the public, the citizen and the professional, the intrapersonal and interpersonal, the deep thinker and the active problem solver—a self-awareness of one's own abilities and expertise within a public sphere of action. We are also assuming that the individual person using PKM skills is central to the collective process of managing knowledge in groups, in organizations and in society. Just as a well-functioning electronic network depends on well-managed individual nodes that are connected to the network, so does community knowledge depend on well-developed individual contributors.

Personal" Knowledge Management assumes that individuals have developed a self-awareness of their limits and abilities—what they know and what they can do. This personal self-awareness is an understanding of how much they know, how to access the things they know, strategies for acquiring new knowledge and strategies for accessing new information as needed. In the vast amount of information available and many means of acquiring new information, individuals have each mapped out their own areas of expertise and their own methods for additional learning.

There is an increased confidence in one's knowledge and in one's knowledge-building capabilities that result from this personal self-understanding. Having worked through the oceans of information and having created roadmaps of those journeys through their writings, filing systems, notes and other means, each person acquires a confidence in their own ability to know or to access or to build knowledge they need. Whether this acquired knowledge is stored in the form of computer files, filing cabinets, book cases, piles or in memory, each person acquires and manages their own knowledge. The information and knowledge is rarely something that can be owned by the individual. But the organization of information and methods of accessing information is almost always personal. This is why you cannot copyright ideas, but you can copyright the publication of ideas in a book that orders them in a specific way.

Of course, the individual never truly develops that sense of confidence and expertise if he or she is not asked to use that knowledge in the service of others. The value of the knowledge and the personal management of that knowledge are evident as it is put to use in a social, public sphere of problem solving. This leads us to the necessary balance of the private and the public. To prepare the individual for self-responsibility—that sense of being able to make commitments to others and to fulfill promised contributions—each person needs effective access to their own knowledge. In this sense, self-responsibility is the ability to use one's expertise and abilities to help others. The ultimate goal of Personal Knowledge Management is not merely to possess knowledge and certain thinking abilities, but to value the use of that knowledge in the service of others and in the enhancement of societal knowledge. The public use of knowledge reaffirms the individual identity of the person who contributes, who has knowledge, who can organize information and who can be a part of a team or a community beyond the self.

PKM, Majors and General Education Requirements

The majors and the general education curriculum are often experienced and viewed by students as at odds with one another. It is the oft repeated phrase "Why do I need to know that? I'm going to be a ...." that is perhaps the most disheartening to faculty. Faculty often recognize the interconnectedness of disciplines and share the more profound observation that the majors each lie upon the foundation of the general education portion of the curriculum. Many students enter college believing that a college education is merely a process by which they will be prepared to practice a profession by learning the latest information relating to the practice of that profession. This view is in contrast to the educational values of many faculty. Even within the field of arts and sciences, there is considerable evidence that students feel that "they have no need or responsibility to integrate their learning across multiple domains of inquiry and practice" (Schneider 30).

As faculty we often find ourselves struggling with the question of how to show our students that it is far more important that they learn to learn and to adapt rather than narrowly focus on achieving excellence in their chosen discipline. Personal Knowledge Management provides a framework for emphasizing both the interconnectedness of the majors and general education as well as for learning to learn and for learning to adapt to change. These are some of the most valuable skills a good college education can offer.

The specific knowledge learned in the major is often fleeting and becomes rapidly obsolete. In the early 1940's supersonic air travel was widely viewed to be and taught as being impossible. Yet students today take space flight for granted. The rate at which the specifics of what one learns in college becomes obsolete is perhaps the most rapid it has ever been. The skills learned by a computer science student as a freshmen will likely have seen great modification by the time that same student is a senior. The greatest constant in all the disciplines is change, and as Darwin pointed out, constant change means constant adaptation or extinction. PKM allows students to develop a deliberate, reflective and adaptable cognitive framework for inquiry and problem solving.

An outline for inquiry and the conversion of data to information and information into knowledge is provided by the seven skills of PKM. These skills are not discipline-specific; in many ways they are shared across all disciplines. The scientist attacking a new problem must first seek what has been done, evaluate the quality and context of the previous work, form a group to study the problem, conduct the needed experimental or theoretical work and finally secure the results until they are presented for publication. The author seeking to write a new novel must read about the time and place the work is set in and must decide what relevant parts of that context will influence the characters and action. The course of the work must then be outlined, and the outline most likely then will be discussed with the author's publisher. The publisher will have feedback. The author must analyze that feedback in context and will perhaps modify the outline before proceeding with the work. While writing, the author should be aware of the security of the work, and finally the work is made into a form presentable for public distribution.

The PKM framework does not require the introduction of a plethora of new learning activities and skills. It simply provides a means of seeing connections in the learning activities we are already engaged in as faculty and students. The scientific method begins with reviews of existing knowledge, formulating an experiment around the unknown, organizing the results of the data collected and presenting the outcomes in the form of findings and future questions to explore. The graphic designer considers the existing designs of an organization, the specific needs of the current situation, gathers needed information and creates a means of organizing that information with a presentation design strategy. Instead of viewing these learning experiences (and many others) in different disciplines as fundamentally at odds with each other, with PKM the students and faculty have a shared vocabulary regarding inquiry processes. Students and faculty as inquirers are provided a means of intellectually bridging these experiences through a broader conception of Personal Knowledge Management. They may gain a better appreciation for what Howard Gardner calls "multiple intelligences" within themselves and among other learners. They should have mastery of their discipline's inquiry methods, but also an appreciation and ability to collaborate with other disciplinary methods.

The glue that binds the majors and general education can be PKM. Two of the primary goals of each are inquiry skills and problem solving skills. The skills of the PKM process outline a method for inquiry that spans the disciplines. These skills also emphasize that the method of problem solving is not inherently discipline-specific. While problem solving techniques seem at first glance to be tightly linked to a specific discipline, the general method often can be summarized as asking, "What do I want to do? What do I need to know to do it? What is already known? How can I create new knowledge to span from what is known to what I need to know? Once I've done what I want to do, how will I let others know?" A business major may want to develop a firm to market mouse traps. This student would ask, "Who buys mousetraps? at what price? and in what volume?" Having done this the student would retrieve, evaluate, organize and analyze the needed information. Next, the student would ask, "How can I get people to buy my mousetraps?" The student would then likely form a presentation of this information and a plan to use it before seeking the collaboration of venture capitalists and engineers, to fund and design the better mousetrap. After developing a better mousetrap they would likely secure their rights through patents, before presenting their new product to the public for purchase. The process would be much the same for a scientist seeking to understand some aspect of the natural world better, or for a politician seeking to address some great societal ill.

Perhaps by emphasizing PKM skills in both the general education and major discipline portions of the curriculum faculty will more often hear "I see how this is important, maybe I can use this in a new way as a ..." and know that a student has learned how to learn.

Using the PKM Framework as a Model for Technology Integration

The seven steps of the Personal Knowledge Management information process provide a valuable framework to introduce and enhance technology integration into an institution's curriculum. One of the clarion calls we hear again and again today in higher education, and even in secondary education, is that we need to introduce students to information literacy skills. The PKM framework provides this introduction paired with critical thinking skills and a clear and structured methodology for integrating technology into education efficiently and constructively. Let's take a moment to examine just a few of the individual PKM skills and consider how they could provide a more seamless integration of technology use across a curriculum.

College librarians were some of the first members of the academic community who had to staff the "front lines" of teaching information retrieval and evaluation skills to students. With the advent of online catalogues, electronic resource databases and the appearance of millions of web sites that students needed to cope with, those in the library had to, and still have to, scramble to keep ahead of the ever-changing and expanding technology curve in information access. These changes have dictated that evaluation of information must be an even larger part of the process. Many librarians developed teaching modules to familiarize students with the proper methods of retrieving and evaluating information. These modules were sometimes developed in cooperation with faculty members in the disciplines and sometimes not. Sometimes those in other disciplines, like English or history, ended up reinventing the wheel, coming up with their own approach to retrieving and evaluating online information. In those cases, the approaches may have been varied or contradictory. However, if PKM skills were adopted across the curriculum, though certainly tailored for each individual discipline and its unique needs, then a common approach, methodology and shared terminology would help integrate proper technology use and information literacy across the institution. Teaching resources could be shared across the campus, and these skills would be reinforced as they were used in the varied courses the students take.

In the same ways, PKM skills of organizing, analyzing and collaborating around information, can offer an overall structured process for intentionally managing information and turning it into useful knowledge. Technology tools provide a special help in organizing and collaborating around information throughout the disciplines and in analyzing information in selected disciplines. If these skills were taught, known and utilized in each discipline across the curriculum, students would come to understand how important holistic information skills and critical thinking skills are in helping to process, interpret and synthesize information and in producing and contributing knowledge in any content area. If the skill sets are general enough, they tend to apply to typical educational tasks in almost every discipline. Though disciplines like English and biology often concern themselves with different types of information and content, many of the skills associated with organizing, analyzing and collaborating around information, especially using the tools of technology, are much the same and could be shared or at least directly compared and contrasted between disciplines that are aware of a similar skill set.

In covering technology skills themselves, one might as well forget the concept of disciplines altogether. Music majors and political science majors alike are all using technology today to store, arrange and manage information. When it comes to PKM skills of presenting and securing information, every single student, staff member and faculty member in the institution needs a firm grasp and understanding of these skills. Whether it is backing up a hard drive, checking for viruses on a floppy disk or properly creating and projecting a PowerPoint presentation, everyone should have the knowledge and experience to perform these tasks. Shared PKM skills, as part of the general knowledge base of an institution, will put every member of that institution on a level playing field, making each individual responsible for her or his own information management, no matter where they fall in the institutional hierarchy. Then, everyone becomes empowered to locate, access, manipulate, shape, control and secure the information they need to complete their varied duties, whether those duties are to keep a set of course grades, research a critical article for publication or share information with peers over the internet.

With institutional adoption of the PKM processes, there is a leveraging of higher order skills associated with utilizing technology and information literacy. Obviously, instead of focusing on "data processing," or specific technological tools, an overall skills process is emphasized here. This larger stability of skills avoids a concentration on tools that may constantly change every three or four years, investing rather in the overall process of learning how to learn that will remain constant. PKM integration, while recognizing the strengths of technological tools, also allows users to recognize the limitations of technology use in education, thereby demythologizing the place of technology in institutions of higher learning. It represents an antidote to an over-reliance on technology skills. Technophiles may not recognize that these tools are only useful insofar as they can assist with specific inquiry and learning skills.

Conclusion

This paper portrays a vision and framework for integrating inquiry and problem solving skills across the disciplines. Currently at Millikin University it has been implemented only in limited parts of the curriculum by self-selected faculty. At this time, a strategy for broader implementation of Personal Knowledge Management—both as a tool for integrating general education and the majors and for integrating technology into the curriculum—is being developed. At Millikin University, we have piloted three courses where students are beginning to utilize PKM skills in conjunction with the development of electronic portfolios. The librarians are also making a concerted effort to bring to the forefront the integration of PKM skills of retrieval and evaluation of information into instructional sessions that are part of freshmen core courses. Key to that library instruction is the focus on concepts of retrieval and evaluation rather than merely proficiency in using retrieval tools.

We continue to look for opportunities to integrate PKM skills into the curriculum. The principal focus of our implementation efforts is on the three key promises of PKM: (1) as a stimulus for an improved sense of student responsibility; (2) as a framework for integrating general education and majors as part of the Millikin Program of Student Learning; and (3) as an approach to technology integration initiatives throughout the curriculum.

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Distance Education, E-core and Faculty-Instructional Design Collaboration

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Abstract

Macon State College has received a multi-million dollar grant from the U.S. Department of Education for use in Distance Education activities. To this result, we are hiring Instructional Design specialists, who work along side with faculty, in order to produce distance learning materials that meet acceptable guidelines. One of these guidelines is the University of Georgia System E-Core guidelines. These guidelines specify how distance ed courses are to be designed in order to provide a consistent and productive online environment for students.

We propose to explain how we are implementing this multimillion dollar project, how the interaction between instructional specialists and faculty are progressing and the results of this effort. We will also show how the UGA's E-core guidelines fit into this model of distance learning.

(This paper was not available at the time the Proceedings went to press. The authors will supply copies of the paper at their talk or provide a url if it is posted on the web.)

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MOUS Certification Solutions

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Abstract

In addition to a formal education, the information technology industry now demands proof of skills for knowledge workers. This presentation is designed to give an overview of the MOUS certification program and how schools can incorporate certification outcomes. Topics include implementation options, program requirements, and training solutions for the Microsoft Office Users Specialist (MOUS) certification. You'll also learn about some of the newest training materials from textbooks to CBTs and live-in-the-application assessment from Course Technology.

SAM 2000 Skills Assessment Manager

Bill Bernys
Course Technology

(These papers were not available at the time the Proceedings went to press. The author will supply copies of the papers at his talk or provide a url if they are posted on the web.)

Faculty Support in a "Time of Inconvenience"

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Introduction

In the resources section at the end of this paper you will find URLs to previous papers I presented at the 1998 and 1999 ASCUE Conferences dealing with faculty support provided at Anne Arundel Community College. Anne Arundel is a comprehensive community college with 210 full-time and 500 part-time faculty members. Courses offered on the web have increased from one in 1996 to sixty-three in Fall 2000. Recently Anne Arundel became one of only five community colleges in the country selected to participate in the Army's virtual university.

The Institutional and Professional Development Office (IPD), Online Academy, HELP desk, and the Center for the Advancement of Learning and Teaching (CALT) provide faculty support at Anne Arundel. In addition AACC has an internal grants program, Designs for Learning, that supports innovative teaching projects. Since I am most directly involved with CALT, the following will be limited to the description and evaluation of several different experiments initiated by CALT to support faculty as they attempt to integrate rapidly changing technology into their teaching.

CALT Experiments in Faculty Support

In April, 1997 budget dust provided the initial funding for the establishment of The Center for the Advancement of Learning and Teaching (CALT) at AACC. A computer resource center for faculty was established equipped with a few computers, optical scanner, digital camera, and several software packages.

CALT Web Site

The CALT web site was placed online in January 1998. Its purpose is to increase faculty awareness of resources on the web related to teaching and learning. An additional purpose is to provide a gateway to web sites demonstrating how the techniques of electronic publishing provide a new mechanism for the creation and distribution of both standard and new forms of teaching materials.

Numerous working examples created for the CALT web site illustrate possible applications of technology to teaching. These can be found at http://www.aacc.cc.md.us/calt/examples.htm and include the following:

A. Presentation on the Web - demonstrates how Power Point presentations can be imported into FrontPage 98 and placed on the web

B. Presentation on the Web - illustrates how presentations can be created directly in FrontPage 98 and placed on the web
C. Teaching Applications of FrontPage 98 - illustrates the use of image maps and forms
D. Picture Quality of Sony Digital Camera - provides examples of image quality possible on the web with a digital camera
E. Video image captured with Snappy 3.0 - demonstrates how a single frame of video can be captured and placed on the web
F. Inline Video Clips - provides examples of video files (.avi)) demonstrating the problem of using large file sizes on the web
G. Screen Capture Video with Lotus ScreenCam 97 - shows how a sequence of steps in a software program can be captured and then displayed on the web
H. Animations - provides three examples of the use of animated GIFS created with Macromedia Flash 3 to create teaching materials
I. Flash 3 movies - provides five examples of teaching materials created with Macromedia Flash 3
J. Streaming Media - eleven examples illustrate the application of RealNetworks technology to streaming text, images, audio, video and Flash animations over the web
K. Spinning Objects - shows an example of how the view of an object can be rotated by 360 degrees
L. JavaScript Examples - pop-up window using JavaScript
M. Acrobat 4.0 PDF - three examples illustrate the conversion of a word document to PDF format, conversion of a scanned document to PDF, and conversion of a web page into PDF format
N. Toolbook II Assistant 7.0 Examples - an example of types of quiz questions
O. Director 7.0 Examples - three examples demonstrate different types of interactive teaching materials
P. Panoramas - panoramas of two sites on campus are demonstrated using PictureWorks Spin Panorama 2.0 software
Q. Flash 4 Movies - five different examples demonstrate the increased capability of Macromedia Flash 4 to create interactive teaching materials
R. Databases - three examples demonstrates the use of FrontPage 2000 and Microsoft Access 97 to provide on the web a database of question and answers selected by keyword, including active URLs in a database, and a database to which data can be added from the web
S. Dynamic HTML - simple examples created with Microsoft FrontPage 2000
T. 3-D Animations - two examples created with MetaCreation Poser 4 software and viewed with the MetaStream Viewer player
U. Flash 5 movies - eight examples demonstrate the increased capability of Macromedia Flash 5 to create interactive teaching materials
V. QuickTime VR - three examples illustrate the application of Apple QuickTime VR technology to create 360 degree views of a real object and of 3-D objects developed using Play Amorphium 1.0 software
W. Flash 5 and XML - examples of client/server data exchange using Flash 5 and XML files
X. Flash 5 and Active Server Pages - examples of client/server data exchange using Flash 5, ASP, and Access 2000

Several faculty and staff members have indicated that the CALT site has been helpful to them in learning about applications of technology to teaching. Most frequently visited pages are Tutorials, Learning, Teaching, Examples, and Electronic Publishing.

The CALT web site has outgrown its initial structure and will soon be converted to a hybrid site with ASP and Flash 5 serving as the front end to a database.

Workshops

Starting in the fall of 1997 CALT offered faculty workshops for creating individual faculty web pages and course web sites with Microsoft FrontPage. About 90 faculty and staff took these workshops before it became part of the training offered through AACC's Online Academy for faculty developing online courses. Now faculty and staff have the option of taking different versions of the FrontPage 2000 workshops offered by either Institutional Professional Development (IPD), CALT, or Online Academy.

From December 1997 through April 2000 CALT offered additional faculty workshops in Macromedia Flash , RealNetworks RealAudio and RealPresenter. In April 2000 a new initiative, developed by Maryland Online, provided training funds to community college faculty in Maryland. In order to support this initiative and to explore faculty interest CALT began offering the following workshops:

Microsoft FrontPage 2000
Microsoft NetMeeting 3.0
Macromedia Dreamweaver 3.0
Macromedia Fireworks 3.0
Macromedia Flash 4.0
Macromedia Director 7.0
Adobe Acrobat 4.0
RealNetworks RealSlideshow Plus 2.0
RealNetworks RealPresenter G2
RealNetworks RealProducer G2
CD-ROM Recording
Dynamic Web Pages

These workshops were given at the AACC campus based on a rolling enrollment of faculty from both on or off campus. Details of these workshops can be found at http://www.aacc.cc.md.us/calt/facultyworkshops.htm . This project met with limited success. During the year these workshops were offered twenty-four faculty enrolled. They were distributed between the following workshops: FrontPage 2000, NetMeeting, Acrobat 4, Flash 4, RealSlideshow, and CD-ROM recording. Out of these twenty-four faculty members, five were from other nearby community and four-year colleges.

Because of the low enrollment I have reduced the number of workshops offered to the following seven:

Microsoft FrontPage 2000
Microsoft NetMeeting 3.0
Macromedia Flash 5.0
Adobe Acrobat 4.0
RealNetworks RealSlideshow Plus 2.0
RealNetworks RealPresenter G2
CD-ROM Recording

For a limited time I will still offer the remaining workshops in a "QuickStart" format which includes a one hour overview of the program, a resource text, and limited support as time permits.

The low enrollments do not justify the time needed to prepare the workshop manuals and the workshop web site. Of course another problem is the constant (almost yearly) upgrades, some quite major, of many of these software packages. I believe there is probably a compromise strategy between providing funds for faculty to take commercial training classes in these programs and offering a limited set of workshops on campus. The advantage of offering workshops on campus is that the workshop instructor can focus on teaching applications of the software whereas commercial workshops target a business audience. Also an on-campus instructor can continue to provide long-term support to faculty after the completion of the workshop.

Wandering Web Watchers

In order to provide a forum for college faculty to meet and discuss the applications of technology to teaching, CALT started monthly, afternoon meetings of the Wandering Web Watchers group. At each meeting the moderator provides a web tour of web sites of interest to college faculty. Faculty members are encouraged to contribute web sites they find of interest or discuss applications of technology to teaching. Sites visited during the 1999-2000 academic year can be found at http://www.aacc.cc.md.us/calt/trip_reports.htm

In the first year (1999-2000) about 8 to12 faculty members attended these meetings during the fall semester but the attendance gradually decreased to 2 to 4 in the spring semester. This academic year (2000-2001) attendance has hovered around 1-3 persons. When these meetings are announced I usually receive 3-5 e-mails from faculty expressing regrets that they can not attend because of scheduling conflicts.

Wandering Web Watchers - Online

Since several faculty had indicated interest in the monthly meetings of Wandering Web Watchers, but were unable to attend because of scheduling conflicts, an online newsletter, Wandering Web Watchers - Online, was started in February, 2001. Three editions per semester plus one summer edition are planned. A description of the newsletter was sent to faculty, staff, and administrators at AACC inviting interested persons to subscribe. Currently there are 95 subscribers of which about 50 are faculty, 30 are staff, and 15 are administrators. The April, 2001 edition of this newsletter can be found at
http://www.aacc.cc.md.us/calt/wwwonline/wwwonlinev1n3.htm

The newsletter not only includes links to sites but also occasional references to sections of the CALT web site that are related to the URLs sited. In this way the newsletter serves as a reminder and guide to the resources of the CALT site. I plan in future editions to expand the newsletter to not only include URLs but to also illustrate dynamic web pages (ASP, Flash, XML), interactive teaching materials (forms, surveys, chat, animations, data analysis, tracked responses, etc), and streaming media (text, images, audio, video, animations). The intent is to increase awareness of teaching applications of technology with the hope that some faculty will be motivated to explore similar uses of technology in their courses.

One-On-One

Faculty training provided by IPD workshops, CALT workshops, and Online Academy is supplemented by one-on-one help by three instructional designers, media center personnel, and myself. The type of one-on-one help offered is strongly dependent on the attitude and computer competency of each faculty member. Some do not want to learn any technology. They just want their content placed on a web site, or converted into a Power Point slide show. Others are willing to learn some of the basic steps needed so that they can proceed on their own with occasional help. A few are willing to spend the time and effort required in order to learn the details of a software package so that they can create teaching materials on their own. We try, as much as possible, to accommodate these different attitudes and computer competencies and encourage faculty to reach the highest level of technical competency they can manage.

The Designs for Learning grants often include a technology component that requires either team or one-on-one support. Again during this process we try to raise the computer competency level of faculty involved in the grant. Presentations of successful grant projects are usually made to other faculty groups at the college thus helping to diffuse technology throughout the college.

Teaching Templates

Technology can be used to help faculty use technology in their teaching. CALT Teaching Templates are pre-programmed software modules that I have written to reduce the number of steps required by faculty to produce teaching materials for distribution on floppy disk, CD-ROM, or the Web. Thus far I have created two CALT Teaching Templates that convert Word documents into Flash 5 interactive quizzes. One has a simple question and answer format; the other has a drag and drop format. These templates as well as the steps required of faculty can be found at CALT Teaching Templates
http://www.aacc.cc.md.us/calt/calt_teaching_templates.htm

So far there has not been much interest in using these templates but I plan on creating a few more related to the dynamic updating of web pages which will only require faculty to produce Word documents.

Traveling Road Show

CALT also offers a traveling road show that will visit college departments to demonstrate software and hardware useful for the creation and presentation of teaching materials on floppy disk, CD-

ROM, or the Web. A laptop computer, microphone, video camera, digital camera, and CD-ROM recorder along with several software programs are used to demonstrate in real time the creation and delivery of web pages containing text, images, audio, video, animation, quizzes, etc. The spiel is similar to the ones presented at county fairs by the hawkers of "amazing and fantastic" kitchen aids. It is hoped that these demonstrations may help persuade faculty that the creation of teaching materials is straightforward and that some of it can be done very quickly.

Suggestions

The CALT "experiments" explore different approaches to faculty support as they attempt to find appropriate, effective, and efficient applications of technology for teaching specific topics in a particular discipline for a diversity of student learning styles. Our experience suggests that there is no one right way to provide faculty support in this "time of inconvenience". A variety of support options are needed to address faculty diversity in computer competency, attitudes, interests, and teaching styles.

Many faculty members recognize that there are some applications of technology to the teaching of their discipline that would improve student learning. The heavy teaching load, at least for community college faculty, means there is very limited time available to learn and practice the latest technology in order to create and deliver technology enhanced teaching materials. This fact along with computer anxiety and uncertainty about the effectiveness of technology enhanced courses compared to traditional courses means that many faculty are reluctant to commit to a long-term effort to attain the required skills.

From one point of view faculty can be considered as independent contractors that are paid a salary. This presents an organizational problem because an administratively imposed requirement that faculty be required to attain a certain level of computer competency generates opposition from some faculty concerned with "academic freedom" issues.

In light of all this, what can be done? I suggest the following:

1. Try to make faculty comfortable with a team approach. Support faculty by forming instructional teams consisting of a faculty member (or better yet a group of faculty), an instructional designer, graphic artist, media specialist (audio, video), and instructional programmer. The instructional designer and faculty member need to be co-leaders of the team to insure that the goals of the instructional team project are achieved on schedule using appropriate resources. Depending on their experience some members of the team could play multiple roles in the project.

   Use these projects to increase the computer competency of the faculty member. I believe it is a mistake to think of faculty as just "content experts". There is more to teaching then content. There will always be limited resources to support faculty so by helping faculty to become more comfortable with technology lessens the demands on support personnel.

2. De-emphasize workshops. Emphasize projects. There is a tendency for faculty to attend workshops dealing with the use of computer software and then because of time constraints

not use the software until much later at which point they have forgotten most of what they learned in the workshop. Perhaps a new term, "teachlet" could be used to designate a combination workshop/project that after initial training sessions requires the workshop instructor and faculty member to meet periodically in order to create appropriate teaching materials.

3. Keep a historical perspective. The rapid change of technology is unique to our times and it will take a while to sort out how to deal with the impact this has on faculty roles, organizational structure, and student learning.

4. Be patient. I have seen some remarkable changes in attitudes occur with people I would least expect. They did not occur overnight. Although the time scale for changes in technology is of the order of months, for people and organizations the time scale for change is of the order of years.

5. Be persistent. Despite repeated announcements, talks, and demonstrations it still is not uncommon to hear faculty say, "Oh, I didn't know that resource was available." Again, because of the hectic teaching schedule of most faculty, it is difficult to get their attention. Repeating the message seems to be the only way to break through and make a connection.

6. Offer incentives. Possible incentives for faculty include bonuses, released time, overtime pay, paid professional development workshops, additional hardware and software, awards, professional recognition, and specific recognition of technology enhanced course development in promotion and tenure considerations.

7. Feel free to ignore the previous suggestions. Every college is unique in terms of mission, resources, organizational structure, and personnel.

I hope the above outline of faculty support "experiments" we are trying at AACC and my suggestions may stimulate new approaches for faculty support at your college in this "time of inconvenience".

Good luck. Build (and protect) the future.

Resources

Center for the Advancement of Learning and Teaching http://www.aacc.cc.md.us/calt/

Helping Faculty Respond To Changing Technology, Bruce Bird, ASCUE Conference 1999
http://www.gettysburg.edu/ir/ascue/Proceedings/1999/bird99.html

Application of FrontPage 98 to the Development of Web Sites for the Science Division and the Center for the Advancement of Learning and Teaching (CALT)at Anne Arundel Community College, Bruce Bird, ASCUE Conference 1998
http://www.gettysburg.edu/ir/ascue/Proceedings/1998/bird.html

eArmyU http://www.earmyu.com

Faculty and Staff Training for the New Millennium Kuber Maharajan, Dewey A. Swanson , ASCUE Conference 2000
http://www.gettysburg.edu/ir/ascue/Proceedings/2000/maharajan.htm

Arthur Levine: Creating an Education System for an Information Age by Dan Page, Converge, October, 2000
http://www.convergemag.com/Publications/CNVGOct00/aurthur.shtm

Campus-Computing Survey Finds That Adding Technology to Teaching Is a Top Issue (The Chronicle 10/12/00) http://chronicle.com/free/2000/10/2000101201t.htm

Fairleigh Dickinson U. Will Require Distance Courses of All Students (The Chronicle 10/4/00)
http://chronicle.com/free/2000/10/2000100401u.htm

Kindling the Fire: How to Attract Faculty to Distance Education
by Nancy Levenburg and Howard Major (Technology Source September/October 2000)
http://horizon.unc.edu/TS/default.asp?show=article&id=803

Faculty and Staff Development (Archives, Technology Source)
http://horizon.unc.edu/TS/

Rethinking Faculty Support by Mark Donovan (Technology Source, September/October 1999)
http://horizon.unc.edu/TS/default.asp?show=article&id=612

One Size Doesn't Fit All: Designing Scaleable, Client-Centered Support for Technology in Teaching
http://www.educause.edu/ir/library/html/cnc9846/cnc9846.html

Technology and Educational Revolution: Ending the Cycle of Failure
http://www.tltgroup.org/resources/V_Cycle_of_Failure.html

Books

Interactive Learning - Vignettes from America's Most Wired Campuses, David G. Brown, editor, Anker Publishing Co. (2000)

Teaching with Technology - Seventy-five Professors from Eight Universities Tell Their Stories, David G. Brown, editor, Anker Publishing Co. (2000)

Records

"Time of Inconvenience" on the *Flyer* CD by Nanci Griffith, Eureka Entertainment, 1994

Implementing a Campus-Wide Event Scheduling System At Salve Regina University

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Abstract

In the fall of 1999, our University of 1,700 students had four independent event scheduling systems, each representative of its own respective area. The areas involved were the Conference Center, the Registrar's office, the Student Activities office, and the Athletics department. Faced with a mounting problem of campus event scheduling conflicts as well as overtaxed support resources, the University embarked on a search for an integrated campus wide event scheduling system.

The report describes the implementation project of a campus wide event scheduling system. The project followed the traditional path for systems implementation of packaged software including, among several other key steps, requirements analysis, vendor package selection, project organization, application software configuration, policies and procedures development, and agreement on scope, phases, and timeframes of implementation. What made this implementation unique for our school was the collaborative effort by the four heretofore independent campus agencies to successfully install a common campus wide system in a timely fashion.

Background

"The World Before..."

Each event scheduling office at the University had its own system for recording events that were held on campus. For example, the Registrar's office, the Student Activities office, the Conference Center, and the Athletics department each had independent procedures and event schedule publications. The Registrar's office would schedule classes and exams by using a module in our student information system (*Scanware*), which runs on an IBM AS/400, and an *Excel* spreadsheet generated from a PC; the Student Activities office preferred to use MACs and an outside publisher to generate its schedule of activities; the Conference Center had a word processing document that was upgraded to an *Excel* spreadsheet on a PC; finally, the Athletic department determined its team schedules with its league conferences and then produced seasonal game schedule flyers for distribution.

Since each scheduling area would generate its own schedule, problems would arise. Several events would appear on some schedules and not on others; there would often be inconsistencies in event times and dates on the different schedules; the schedules would not allow for updates due to publication deadlines; there was a tendency to inadvertently over book events on certain days and under book events on other days; and the supporter parties had to check with different offices to determine resource requirements. Because of the multiple scheduling offices operating in an independent manner, there were numerous miscommunications, misunderstandings, and tendencies for 'last minute' decisions, made in a stressful mode, for conducting events.

A Call for Help

The University had implemented a 'One Card' system for University students and staff in January, 1999; this system was well-received and it was recommended to offer a modified 'Conference Card' system for the 1999 set of summer conferences. The card system vendor (CBORD) informed us that it was introducing a new Conference and Guest Management System (*CGMS*) that might be of interest to us. In the fall of 1999, a first effort was made to investigate the *CGMS* system by reviewing some documentation and conducting some reference checks (e.g., Kansas State University).

In the meantime, other seeds of interest were breaking soil. The Registrar's office and the Student Activities office had seen different event scheduling systems at their respective professional conferences and thought that a more collaborative and automated approach would be of benefit. They recommended that a package named *Scheduler Plus* from CEO be considered. Further, the University was building a new Rodgers Recreation Center (athletic wellness center), the first such center on campus. The center was seen, among many things, as a facility for bringing the University community together by attending a variety of events, such as athletic games, and by engaging in exercise activity. Finally, through an institutional planning process initiated by Therese Antone, RSM, the University's President, one need that surfaced was to create a 'vibrant, learning community' at the school. One of the goals was to do a better job planning for and communicating information about University events.

Requirements Study and Product Reviews

General Requirements

Several items were mentioned by the different scheduling offices as being essential in an event scheduling system. For example, a general requirement of an event scheduling system was that it allow for interdependent scheduling of events using a common data base of campus spaces, times, and resources. Although primarily intended as a resource management facility, it should also have the capability of outputting a variety of schedule reports for the user community. In addition, it should have a facility to generate 'ad hoc' reports and contain a web-accessible component for parties internal and external to the University. Other requirements are listed in the 'Requirements Summary Checklist'.

System Requirements:	Acceptance
General:	
1.- Allows Multi User Data Entry to Common Database	
2.- Allows Natural Areas of 'Eminent Domain'	
3.- Efficiently Communicates Shared Resource Requests	
4.- Provides Smooth Procedures between Requestor – Requestee	
5.- Keeps Track of Allocation of Shared Resources (Rooms, etc.)	

6.- Automatically Adjusts Available Inventory	
7.- Provides Queueing Capability for Shared Resource Requests	
8.- Provides Easy Procedures for Blocking Rooms, Dates, Times	
9.- Efficiently Broadcasts Event Schedule to User Community	
10.- Provides Efficient Procedures for User Interface	
11.- Provides Easy Query Capabilities for Users	
12.- Provides 'Real Time' Updates to Event Schedules	
13.- Retains History of Event and Required Resources	
14.- Retains Previously Used Seating Plans for Event	
15.- Accommodates Recurring Events	
16.- Allows Different Rate Structures for Event Services / Groups	
17.- Provides Informative, Flexible, and Efficient Billing Procedure	
18.- Tracks Costs for Different Event Activities	
19.- Accommodates Multiple Contracts / Multiple Events	
20.- Provides Subconference Capability tied to Event	
21.- Provides Special Activity Capability tied to Event	
22.- Accommodates Setup/Breakdown Requirements for Event	
23.- Accommodates Variety of Seating Plans and Room Attributes	
24.- Accommodates Contract Reporting, Tracking, and Billing	
25.- Accommodates Special User Defined Codes and Parameters	
26.- Accommodates Special Comments or Notes for Event	
27.- Provides Standard Set of Meaningful Reports to Users	
28.- Provides Procedures for Using Report Data in Spreadsheets	
29.- Provides Training (Remote, On-Site), Manuals, etc.	
Technical:	
1.- Provides Proven Reporting Tool (e.g., *Crystal Reports 7.0*)	
2.- Provides Proven Database System (e.g., *SQL/Server 6.5, 7.0*)	
3.- Provides Robust Security Administration	
4.- Operates under *Windows / NT 4.0 Server*	
5.- Operates under *Windows 95/98/NT* Client Systems	
6.- Runs Effectively with *Netscape Navigator* or *IE*	
7.- Compatible with Microsoft Tools (e.g., *Excel, Project*, etc.)	
8.- Accommodates Mobile User Login Capability around Campus	
9.- Offers Acceptable Screen Response Time	
10.- Vendor Offers Responsive Remote Support Capability	
11.- Provides Clear Delineation of Network/DB/Apps Security	
12.- Provides Flexible Import / Export Procedures	
13.- System Can Operate over Campus Data Network	
14.- System Can Operate on Pentium Processor Computers	
15.- Vendor Provides Comprehensive Installation Support	

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Product Reviews and Reference Checks

The product investigation team included members from different areas on campus involved with event scheduling. There were representatives from the Conference Center, the Registrar's office, the Student Activities office, the Athletics department, the Dining office and the Information Technologies office. To augment the stature of the project, the VP of Administration accepted the role of the senior administrative "champion" of the project. The initial product that was investigated, *CGMS*, did not fare well in our reference checks. At the time of our investigation, this product seemed to focus more on the guest management perspective rather than the conference management perspective. A second product, *Scheduler Plus*, seemed to have all of the functional features desired, except it appeared to be a better fit for the needs of a single scheduling office rather than a multi-user campus wide scheduling environment.

The third product investigated, *Resource 25*, was actually recommended through a reference check of the second product. *Resource 25* supported a multi-user scheduling environment using a supported data base system (SQL/Server), with a proven report generation tool (*Crystal Reports*) and with web-accessible capabilities.

Concentrated Effort to Review Leading Product Candidate

One difficulty in analyzing the *Resource 25* product was its lack of sales support in the New England area. Further, it had no procedure for distributing sample applications on a CD. Finally, the company (Universal Algorithms, Inc.) is located in Portland, Oregon and since we are in Newport, Rhode Island, it was not convenient for us to visit the sales office for a product demo. As an alternative, however, the vendor suggested that we conduct remote product demonstrations of *Resource 25* using Microsoft's *Net Meeting*; this technology allowed us to connect their sales office with our University campus in a convenient manner. As a result, we conducted four or five in-depth discussions of the product over the Internet through *Net Meeting* and a telephone connection.

After signing a non-disclosure agreement, the vendor offered us the review of its product documentation (hard copy and online) and web-based demonstration session. These items were reviewed by members of the product investigation team both from an application and a technical perspective. The product investigation team developed a common set of questions to ask of different reference parties. It was encouraging to find that *Resource 25* had already been selected by a number of schools in New England (Wellesley College, Bentley College, Bridgewater State College, Middlebury College). Many references did caution us, however, that the implementation process could be very time consuming, particularly if more than one scheduling office area were involved in the project.

Bolstered by the positive feedback we had received, more serious activity was conducted. The *Resource 25* users at one prominent Massachusetts school, Wellesley College, invited us to visit their campus and to discuss their experience with both the implementation and use of the *Resource 25* system. Although Wellesley initially focused on special events and conferences, there were enough similarities with the environment and procedures that the visit was very beneficial. After reviewing demonstrations of the *Resource 25* system with vendor data, it became imperative to view the system using data that our users could recognize. To this end, a sample set of Salve Regina data consisting

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of campus spaces, resources, requirements, and events was sent to the vendor who prepared a demonstration session for us using the indigenous data. A final *Net Meeting* demonstration was conducted using the selected Salve Regina data that allowed us to 'test drive' the system on a more meaningful manner.

After the final *Net Meeting* demonstration in May 2000, the product investigation team unanimously voted to recommend the purchase of the *Resource 25* system for implementation at Salve Regina. The overall investigation process covered seven months from the initial product review to the final recommendation.

Project Implementation

Project Organization

After the funding for the application was approved and provided, it became important to establish a solid organization for the implementation of the system. Due to the campus wide perspective of the implementation, it was anticipated that several event scheduling policies would have to be established and several event scheduling procedures would have to be redefined. This result warranted broader senior administrative participation in the implementation. Thus, a steering committee was established along with the required project team.

The steering committee, which meets on a monthly basis, consists of the VP of Administration (who oversees the Conference Center), the VP of Finance and Business Affairs (who oversees the Information Technologies office), the VP of Student Life (who oversees the Student Activities office and the Athletics department), the Registrar (who oversees the Registrar's office), and the director of IT (who serves as the project coordinator). The project team, which meets on a weekly basis, consists of the Conference Center coordinator and support person, the director of Student Activities, the director of Athletic facilities, the assistant registrar, the dining service manager, a senior programmer analyst assigned to the project and the director of Information Technologies.

Project Plan

It was important to describe the key benefits of implementing a campus wide event scheduling system to members of the University community. The primary benefit was to establish a recognized communication tool for all University parties regarding the occurrence of events on campus. It was also important to reduce any confusion in the naming of events, to reduce any conflicts on the dates of important events, to eliminate any redundancy in efforts, and to operate more efficiently from a space allocation and resource utilization perspective. Based on the experiences that we had heard from other schools that had implemented such a system, it was suggested that the system be implemented in phases with predetermined scopes. The summer orientation and conference season of 2001 was targeted as the goal to have the system fully implemented. In the meantime, key milestones were set on system installation, data base population, and prototype events.

Initial training was seen as a critical activity. The *Resource 25* system provides a framework of components that have to be understood, defined and utilized. There is a particular set of rules that have to be followed in a certain order in developing the system. This result requires specific training that is typically conducted on a limited basis in Portland, Oregon. Because of the personalized nature of the training, the vendor set a limit of only twelve persons to a workshop and a maximum of three persons from the same institution. Our initial group that was sent to training in mid-August 2000 included the Conference Center coordinator, the assistant registrar and the senior programmer analyst. This group returned to the University with a better understanding of the system. Resultantly, they set about to build the space master list with all of its attributes and features, the list of contacts and the list of organizations. Soon after they returned, an initial event type hierarchy was established for the system.

Important Decisions

An event scheduling system is a key communication tool for the University community regarding campus events. This result suggests that specific parties who play key roles in event scheduling need to be identified, such as the requestor, the scheduler, and the supporter. The requestor is the one who naturally requests that an event be conducted; this party needs to be aware of head count, resource requirements, and dates among other items. The scheduler accepts the responsibility of serving as the key communicator of the event, particularly to campus parties; this person utilizes the *Resource 25* system to determine appropriate uses of campus spaces, sees if there are any conflicting events occurring around the same time, and ensures that all support parties are made aware of the request for resources. The supporter provides a specific resource service for the event such as dining, table and chair setup, audio visual equipment and security concerns. These roles had to be identified and acknowledged in order for the system to run efficiently.

Other important decisions involve the event type hierarchy and the manner of scheduling. Events are classified by different type in the *Resource 25* system. For example, types include class, exam, game, practice, meeting, etc. The event type hierarchy, however, is permanently defined. Further, it is very difficult if not impossible to undo a particular event type once defined. The key decision at the outset, therefore, was to establish an event type hierarchy that was comprehensive and representative, yet not too detailed. In addition, a very challenging decision for a multi-user campus wide event scheduling system, is whether to schedule events by type of event, space (facility), or customer (requestor). This decision is central to the role of the scheduler. Its result affects procedures for requestors to follow. We opted to follow the event type procedure as

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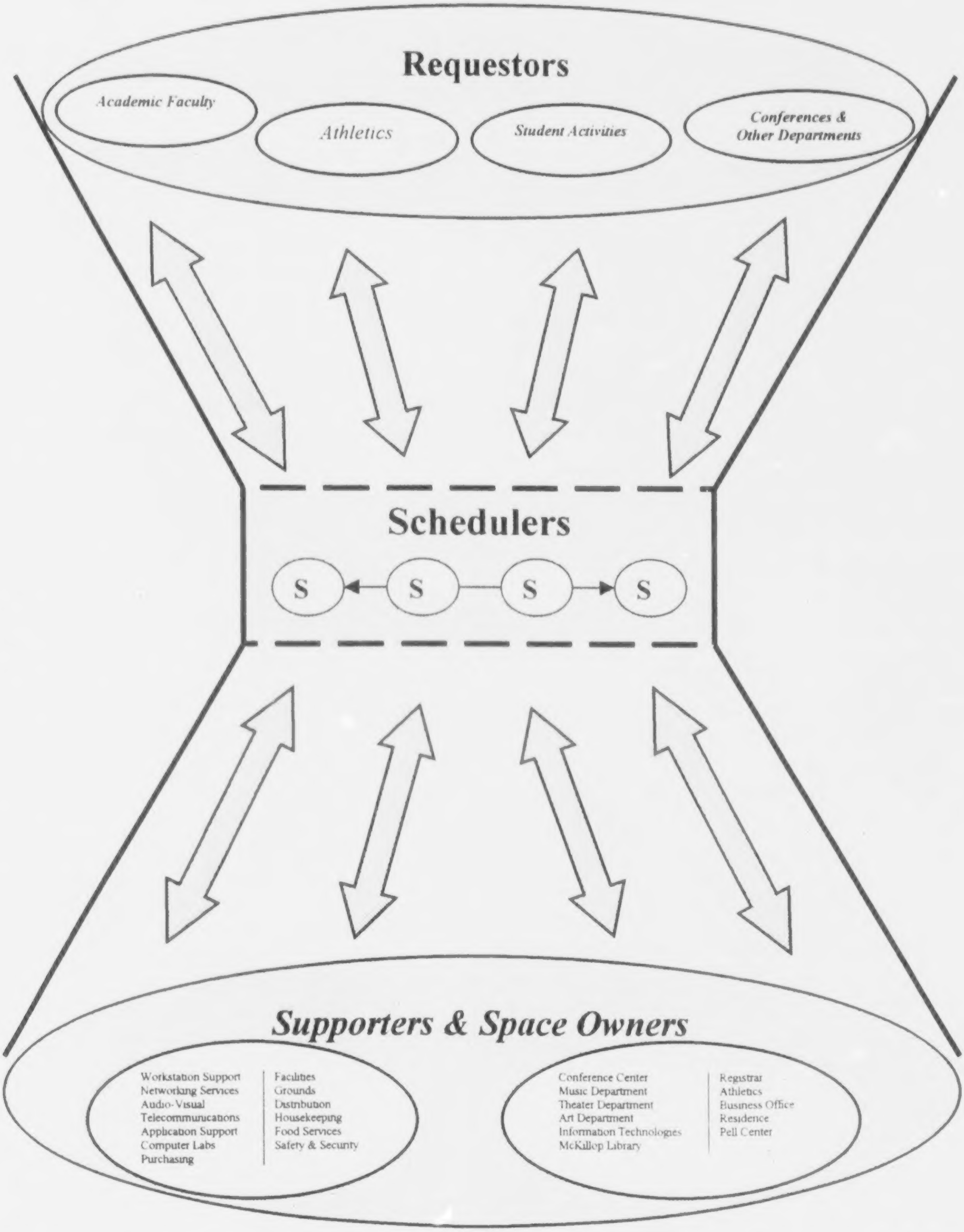
Event Scheduling Communication Model



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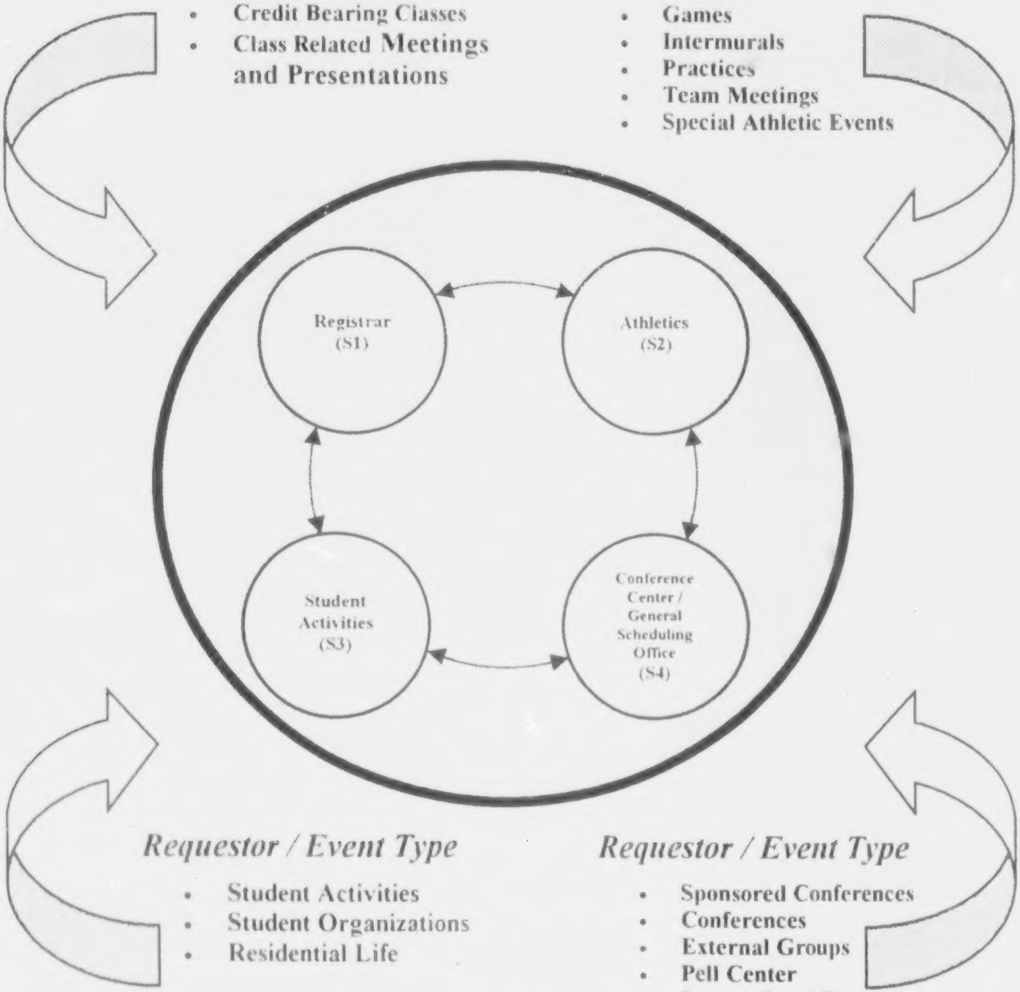
Requestor / Scheduler Relationship Model

Requestor / Event Type

- Faculty
- Credit Bearing Classes
- Class Related Meetings and Presentations

Requestor / Event Type

- Athletics
- Games
- Intermurals
- Practices
- Team Meetings
- Special Athletic Events



Requestor / Event Type

- Student Activities
- Student Organizations
- Residential Life

Requestor / Event Type

- Sponsored Conferences
- Conferences
- External Groups
- Pell Center
- International Programs
- All Other Requests
  - Admissions
  - Alumni
  - Art / Music / Theatre
  - Development
  - Human Resources
  - Career Development
  - Campus Ministry
  - Presidential Functions
  - Special Academic Events
  - Special Events
    - Connections
    - Convocation
    - Commencement
    - Governor's Ball
    - Open House

much as possible; this allowed us to rely on particular scheduling office expertise in fully planning for an event.

Finally the determination of project phases and scope required an important decision. With the ultimate goal of achieving full implementation of the *Resource 25* system on campus by the summer season, 2001, it was important to establish recognizable phases of implementation. It was felt that, in the first phase of implementation, the system should cause a minimal amount of disruption in the request and support of events. Thus, for the most part, campus requestors of events would go to their accustomed scheduling office for this service. On the supporter side, a new '**Salve Regina University Calendar of Events**' report would be developed and distributed to key support parties on a weekly basis; this report contained a substantial amount of event information similar to yet beyond what was previously distributed. The web accessible components would be introduced in a later phase.

Testing and Acceptance

Because of the rigidity of the *Resource 25* system with regard to the event type hierarchy and certain master list entries, it was decided that once an initial framework was agreed to, a copy of the system would be made and preserved for future production use. In the meantime, the various scheduling offices could practice on the test system where decisions and actions could be more easily tolerated. This action occurred in November 2000.

For testing, two levels of prototypes from each scheduling area were targeted. The first level would be a typical simple event such as a game, a class, a presentation, etc. The second level would require additional resources, extend over a couple of days and consist of various sub events; some examples included a small conference, a series of games and a set of department exams.

Because only three project team members were given formal training, it was necessary to provide additional training in using the *Resource 25* system to several more persons. Rather than send a larger group of persons to Oregon, an arrangement was made with the vendor to conduct the training on site at our University. In this way, we could have up to 10 persons involved in the three day of training; this activity occurred in December, 2000.

As a result of the two levels of prototypes that had been completed and the on-site training that confirmed several decisions and procedures previously made, the project team recommended that the event scheduling system be targeted for phase one production use in January, 2001. This recommendation was made to the project steering committee later in December; the project steering committee approved the recommendation.

Production Use of Campus Wide Event Scheduling System

Phase I

Because the University had independent event scheduling procedures before the implementation of the *Resource 25* system, it was suggested that some of these procedures stay in effect, in a parallel mode, for a minimum length of time. One scheduling office, the Conference Center, had the biggest challenge because previously, there were several parties in their office who could update the *Excel* spreadsheet event schedule whereas with the *Resource 25* system, more extensive user training was required. Further, the Conference Center coordinator was only available for limited duty during this transition. Thus, other team members had to provide additional time and effort in order for the system to be used properly.

The Registrar's office scheduling function primarily occurs in the student information system (*Scanware*). The challenge in this area was not so much in training as it was in developing an efficient system interface between the student information system (*Scanware*) and the event scheduling system (*Resource 25*). An extensive effort involving detailed customization proved successful in populating the *Resource 25* system with spring semester class schedules; the **VCAL** file format was used in creating the transaction file for the interface.

In addition to changing procedures within the respective scheduling offices to comply with the new *Resource 25* system, it was also important to deliver event information to various University offices from this central data base source. One requirement that did not surface until after the system had been in production mode was that a certain key office (President's Office) preferred to see event schedules not in a report format but in a calendar format. Several event calendars had been created on campus from different sources under the previous event scheduling paradigm; it was expected, therefore, that a calendar could be produced from the new scheduling system. The vendor, however, did not have a calendar format report available at this time; its release is planned for later this spring. As an interim solution, a stand-alone calendar application was populated manually with information contained in the **'Salve Regina University Calendar of Events'** report; the President has also been provided with a utility to generate this report for whatever desired timeframe, from her desktop computer.

A distinction was made early in the implementation process between a person who is responsible for campus space such as a building, and a person who is responsible for an event that occurs in a campus space; the former party is called a 'space owner' and the latter is called an 'event scheduler'. When the event does not have any resource requirements other than space, the space owner could arrange for the event and then notify the appropriate scheduling office; if the event does have additional resource requirements, however, the request should go immediately to the scheduling office that will oversee all of the planning for the event. These roles are slowly evolving into the appropriate form.

Two challenges that we have experienced thus far involve resource management and communications. A limitation of the current release of the *Resource 25* system is that it assumes an infinite capacity of resources. This result allows the means for a scheduler to record the need for a particular resource, such as a laptop or a projection unit, without acknowledging the availability of the resource; the burden is placed on the supporter party to determine the availability and offer an alternative means to satisfy the requirement. Different schedulers are at different comfort levels in using the system. It is important, however, to communicate with each other with regard to event space utilization, concurrency of events and resource availability.

Salve Regina University Calendar of Events

Event Times		Space Reservation Times		Location	Contact	Scheduler	Head Count	Requirements	
Sat 03/31/01									
8:00AM NEASC Setup	12:00PM	8:00AM	10:00PM	Rodgers Conference 205 Rodgers Conference 205a		sa		Space	Approval-Mike Plansky
8:00AM Student Leadership Conference *"The Missing Peace"*	2:00PM	8:00AM	2:00PM	Wakehurst Commuter Lounge Wakehurst 204 Wakehurst 200 Wakehurst 206 Wakehurst 304 Wakehurst 306	Mr. John Rok *x2205*	Tracy	50	Administration Space	Contract Required Insurance Required Approval-Chris Jachimowi
9:00AM ADJ092-01 *WKSP: CHILD ABUSE ADVOCACY*	4:00PM	9:00AM	4:00PM	O'Hare 161	Mr. Warren Hurlbut *x8376*	Fuller	70	Service	Security-Bldg Open Security-Bldg Close
9:00AM HLC560-02 *SPTPC: DESIGNING & IMPLEMENTING INTERVENTIONS FOR GLOBAL CHANGE*	5:00PM	9:00AM	5:00PM	Wakehurst 201	Ms. Virginia Swain *x8393*	Fuller	20	Service	Security-Bldg Open Security-Bldg Close
9:00AM MGT080-05 *WKSP: ENTREPRENEURIAL STUDIES*	4:00PM	9:00AM	4:00PM	O'Hare 223	Mr. Clifford Robbins *x8011*	Fuller	35	Service	Security-Bldg Open Security-Bldg Close
9:00AM PDI Workshop *PDI Workshop*	12:00PM	9:00AM	12:00PM	McKillop Library 008	Mrs. Jana McHenry *x8008*	Fuller	20		
9:00AM PDI Workshop II	4:00PM	9:00AM	4:00PM	O'Hare 107 O'Hare 113 O'Hare 114 O'Hare 120 O'Hare 121 O'Hare 123 O'Hare 206 O'Hare 210 O'Hare 214	Mrs. Jana McHenry *x8008*	Tracy		Service Space	Hskp-Cleanup Security-Bldg Open Security-Bldg Close Security-Notification Conf Ctr - Monitor Approval-Hal Fuller
9:00AM RIMAP Board Mtg	12:00PM	9:00AM	12:00PM	O'Hare 106	Sr. Esther Whalen *x2163*	Tracy			
9:00AM SOC059 & SWK059 - Saturday *WKSP: WORKING FOR CHANGE IN THE COMMUNITY*	3:00PM	9:00AM	3:00PM	O'Hare 228	Sr. Patricia Hartigan *x3163*	Fuller	40	Service	Security-Bldg Open Security-Bldg Close
9:00AM SOC067 & SWK067 *WKSP: THE IMMIGRANT EXPERIENCE*	3:00PM	9:00AM	3:00PM	McAuley 105	Dr. Joao Monteiro *x3253*	Fuller	37	Service	Security-Bldg Open Security-Bldg Close

Further, there is the issue of properly informing the University community at large of the new event scheduling system. Three formats of information on the new event scheduling system were considered in order to effectively communicate with the University community. The first format is through articles in the campus newspaper, the **Navigator**; thus far, there has been a general announcement of the *Resource 25* system in the newspaper, and more recently, a feature article and picture. The second format of information is by creating an event planning pamphlet that can be distributed around campus and available in each of the scheduling offices; this item, which has been designed by a member of the project team, contains a brief description of the procedure for requesting an event as well as an event planning form. Finally, the third format is a more detailed reference manual for the different scheduling offices; this item, which is currently being prepared, would be useful for the different scheduling offices in better planning for the scheduling of an event. It would contain space guidelines that should be considered in assigning space for an event as well as key definitions, concepts and procedures.

Phase II

In preparing for phase II of production system use, there are a few items that need to be addressed. First, there is the item of space ownership jurisdiction. An agreement, initiated at the senior administration level, is needed in order to determine when campus space can be utilized in particular buildings by certain requesting parties; there are at least six such areas on campus that are under review. Further, as a means to document the event request, a web-based event planning form of similar format to the event planning flyer is being considered as well. This item would be useful for parties internal and external to the University.

Finally, there is the need to provide web access to the calendar of University events from both an internal and external perspective. The *Resource 25* system has the capability of providing supporter parties with a web accessible 'to do' list of requirements for various events scheduled on campus. It can also provide a utility for extracting event information for certain event types and dates. In addition, for external parties visiting our web site and wanting to know more about various events on campus, a customized web accessible event list is being considered.

Summary

In retrospect, the success of the campus wide event scheduling system at Salve Regina University thus far can be attributed to many factors. The sponsorship of our senior administration, particularly the VP of Administration, has been a significant factor; this involves the financial resources as well as the commitment of staff time for the project. The dedication, cooperation and fortitude of the project team were of critical importance. The representation of the different scheduling offices in the needs analysis, product reviews and selection, and software testing allowed the system implementation to possess a deeper level of ownership and thus commitment to the tasks at hand. Finally, the availability and understanding of operational support resources, when most needed, were very beneficial.

E-Mail: Just What Sort of Communication IS This?

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Communication in today's world is critical, and anything which fosters quick, effective communication within a business or with the customers of the business should be very attractive. Why, then, is this imaginary advertisement a bit problematic?

> We have the tool to solve all your communication problems! It will require only one-half hour to an hour each day of your time, but sometimes more. It is expensive. Things could go wrong and leave you unable to do your work for a while, but when it works, you will be connected 24 hours a day. Make sure your IT staff knows about it so they can plan for plenty of disk space. You will be able to store all your communication for later retrieval.

Somehow this "tool" of e-mail is here, whether or not we asked for it. The "only one-half hour to an hour each day" is probably conservative. We spend a great deal of time with our e-mail, and things do go wrong. One faculty member at Saint Mary's reported that she could not work without her e-mail, but that it had serious problems. Not the least of these problems was the message she received saying that the address was invalid each time she sent someone a message. The problem was that her addresses were in fact valid, and she ended up sending the same message multiple times. As she said, "You can't have e-mail that has its moments." What is this new form of communication which has invaded our homes and work places and demands an inordinate amount of our time?

Communication is not new. Perhaps we can gain some perspective by looking back a bit in history at some other forms of communication, namely letters, telegrams and telephone calls. Each new form of communication certainly changes social relationships and does not always develop as intended by those who originally developed it. Samuel Morse originally designed the telegraph for synchronous two-way communication between two people. This didn't prove to be practical, but the telegraph was ideal for many other uses. Prior to the telegraph, business relations were done through contacts among people who knew each other; with the telegraph, this was no longer necessary. (Baron, pp. 218-19) Alexander Graham Bell was a speech expert; for him, the telephone was less a tool for transmitting a message than a device for transmitting voices. (Baron, p. 220) The important thing to note here is that Bell intended more than just conveying a message; the tone of the conveyor could also be transmitted, making it a richer form of communication than the telegram. At first, the telephone was used for practical matters such as business and emergencies. After World War I however, it was used increasingly for social reasons, enabling people to maintain social ties with distant family and friends. This same evolution took place with e-mail. ARPANET, the forerunner of the Internet, was not designed for exchanging personal messages. In the 1970s and 1980s, those who had access to e-mail were mostly faculty and/or researchers. It was not until the explosion of networked computing in the 1990s that the use of e-mail became ubiquitous. The reader might consider the date of his or her first use of e-mail; it was not that long ago. Not surprisingly, e-mail is gradually replacing the telephone and the traditional letter for two-person social discourse. (Baron, p. 227) An article published in the Wall Street Journal estimated that 4 trillion e-mails were sent in 1998 as opposed to 107 billion pieces of first class mail sent through the U. S. Postal Service.

But have we gone backwards from Bell's idea that communication involved more than just the message? Have we, in fact, reverted to very fast, very cheap telegrams? Consider how our space is affected by e-mail and what we are willing to disclose in an e-mail. E-mail messages are in no sense private; the current President of the United States has stopped sending e-mail to his daughters, knowing that all White House e-mail is archived. Nevertheless, when we write e-mail messages we do so in our own space. While it is hard to hear your phone ring and not answer it, it is easy to wait for a convenient time to respond to e-mail. The reader should ask himself/ herself whether he/she prefers to provide someone with a phone number or an e-mail address and why. However, that same privacy with e-mail does allow us to impinge on the privacy of others by initiating conversations with people we do not know. How invaded we feel when our e-mail is flooded with ads, for example. This quasi-anonymity of e-mail has another interesting result; research shows that the more anonymous one feels, the more one is willing to divulge on line. People are willing to make far more personal disclosures that they would with more visual cues (i.e. on the telephone or in person). (Baron, p. 233) We have to conclude that e-mail is certainly not the same as telephone calls, and telegrams never were as long or as numerous; they were too expensive. This brings us full circle to the original questions: What IS e-mail? Is it a form of speech which happens to be written or is it really a form of writing? It seems to be something of a cross-breed; a survey of typical messages would be enough to convince anyone that it is not formal writing. Just consider the abbreviations, smiley faces, etc. that are in use. However, from the social standpoint, it is writing, since those conversing are physically separated. We do, after all, have to type those messages, but often these are not edited. However, a message often reads as one would speak. The language is relatively informal; first and second person pronouns are common, as are contractions. (Baron, p. 251) Face-to-face speech it is not; the visual clues and tone of voice are missing. Therein lie some of the problems.

A recent campus controversy at Saint Mary's led to a flood of e-mail being sent to all members of the community. The president alone received 105 e-mail messages on the topic, some broadcast across the campus and some private. As the one of the vice-presidents reported, the messages certainly were passionate, but occasionally sharp-toned and lacking in the respect for another's opinion which one expects in an academic community. Interestingly, part of the debate became whether the e-mail forum was a proper place for the debate. That quasi-anonymity made it too easy for people to write things which they would not say in the same way in speaking face-to-face. The e-mail generated during the controversy was invasive and yet incomplete. As one faculty member pointed out, the problem is that e-mail can be sent immediately. One does not even have to pause to put it in an envelope and seal it. Although many of the messages violated good taste, none violated campus policies for use of e-mail. Policies, though necessary, are no guarantee that there will not be problems.

Perhaps the academy can learn some lessons from the business world. Net Daemons is a computer-consulting company in which 90% of the employees work at the clients' offices. E-mail is the company's primary method of communication. Jennifer Lawton, of Net Daemons, considers the best uses for e-mail to be screening information, confirming and organizing information, bringing work on the road, keeping track of "to-dos" and calls, and keeping assistants up-to-date. She also uses it to stay in contact with family and to send little personal messages. However, she is quick to point out that e-mail is not an all-purpose communicator. Arguments in e-mail (the campus controversy comes to mind!) and abusive language should always be avoided. She cautions that there are some rules which should be followed, including using appropriate subject lines, being considerate of the recipient's time and honest about your response time. She warns that some things should be done in person or on the telephone. A final warning: "You could read and send e-mail all day long and never accomplish your true goals. Resist e-mail's temptation." (Lawton)

Jim McCann, founder of 1-800-FLOWERS, has some additional advice. When the company first began, it worked with a toll free telephone number, which, at that time, was cutting edge. Now the company operates with a networked collection of florists. Supplies, sales and exchange orders with other shops on the network are processed in a fraction of the time it used to take to write everything down and make a phone call. The company started using e-mail in the early 1990s and found that its use created more time for internal interaction. McCann points out, however, that it is not a replacement for real-time, real-world interaction; it is only a supplement. As president of the company, he gets hundreds of messages daily; he gets copied on almost everything. His secretary has to sort his in-box. In a sense this is a problem he has deliberately created, since he has made his mailbox available to everyone at the company. He feels that the success of the company is due in large measure to the fact that he interacts personally with employees, customers, vendors and others, and he does not want to isolate himself. At the same time he has made sure that his employees know that he much prefers meeting in person. E-mail complements face-to-face discussions, but does not replace them. "Nothing beats a five-minute, face-to-face update." (McCann)

Both Lawton and McCann deal with an enormous amount of e-mail. How can we deal with this flood? Bradley Feld, writing in "Managing Your E-mail: An Entrepreneur's Checklist," offers some advice. He is an entrepreneur who runs several companies with no physical headquarters. He thought it was neat to get so much mail five years ago; three years ago he thought it was annoying. Then it dawned on him that he had to deal with it. He first suggestion is to develop an e-mail rhythm, and stick to it. Do you deal with it first thing in the morning? What is your standard response time? If others get used to your rhythm, there will be fewer problems. There is real advice here for academic communities, where the students and faculty sometimes work at very different times of the day. Do we really want students to expect that an e-mail posted at 3 a.m. will be answered before 9 a.m.? If students understand how and when we will respond, their expectations will match our ability to deliver. If we do not explain how we deal with e-mail, students are likely to expect that we will be available almost on a 24/7 basis. Feld also advises that we never touch an e-mail more than twice. If it does not require immediate attention, deal with it in sequential date and time order the next time you are free. He offers a work of caution about the use of filters and folders; e-mail that ends up in folders is easily forgotten. Responses should be kept short; this is the nature of this form of communication. Unless you really want to continue e-mail conversations forever, respond only when necessary. Most importantly, when e-mail gets out of control, pick up the phone. E-mail is a tool, but not a replacement, for communication. (Feld)

Students send their e-mails in a very comfortable environment. Most of their messages are personal;

they are able to send them using campus equipment at any time of the day or night. In many ways, we do not prepare them for life after graduation. Many companies have policies which restrict the use of e-mail; those personal messages may well have to be sent from home, with fees going to an Internet provider. However, the use of e-mail has grown so rapidly that, even in this comfortable environment, students are getting exposed to some of the problems. Unwanted messages are not uncommon. Students at Saint Mary's are so overwhelmed with messages sent about events on campus that many delete these without even reading them. The Vice President for Student Affairs recently felt the need to respond to pleas from students, faculty and staff that the flood be controlled. In an e-mail with subject heading "Mass E-mailing," she urged everyone to be judicious in the use of e-mail. She asked that clear subject lines be used and that advertising and lost and found notices be handled in other ways.

What then do we conclude? E-mail is neither speech nor formal writing, but something in between. It is so easy for people to send messages that we can frequently be flooded with e-mail. Although e-mail has not quite the same urgency as a phone call, the sender may well have the same expectations in terms of response time. All of this suggests that we must plan ahead for a reasonable way to handle the flood, and we must establish a personal policy for our response time. If those who send us the most urgent messages (perhaps our students sending those messages at 3 a.m.) understand that we routinely check our e-mail only at certain times of the day, their expectations will be set according to our plan, not their plan. E-mail is here; it is not likely to go away, but we can control the way in which it invades our lives.

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Fast Track Network Certifications and Competition from Non-traditional Educational Institutions

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This paper presents a forum discussion on the competition of non-traditional and traditional educational training delivery methods.

The presenters of this paper have taken the position that many non-traditional students , those taking courses offered by mostly profit motivated competitors, may emerge from study programs with unexpected consequences including low comprehension, short material retention, low job satisfaction, and even with dis-enchantment of the entire educational process.

During this discussion we will outline two basic timing sequences, the normal degree or certificate program using the multi semester format (traditional), and the newer more compressed, higher paced, more seminar style schedule (non traditional), which we feel is at the heart of traditional and non-traditional discussions. We will also discuss the different methods and motivational tactics of the two instructional approaches.

For this discussion, we will refer to the newly created, often for-profit training entity as the non-traditional, while addressing the state or private college as the traditional.

At Horry-Georgetown Technical College we offer a wide variety of computer network educational programs. Our traditional timing is based upon the normal semester. Students choose and enter a particular program, typically lasting between two and five semesters, and steadily progress through coursework until all requirements and goals have been met. Our most common student completes one major course of study.

Currently we offer a wide variety of programs preparing students for certification in nationally recognized network areas such as MCP, CNA, MCSE, and CCNA., A+, Network+, as well as a number of additional certificate and degrees.

At HGTC, our primary instructional method is classroom lecture, which we integrate with intensive laboratory and homework assignments and exercises. Each assignment is designed to reinforce the topics and skills needed for certification success. During a typical semester a student is introduced to each selected topic, then are asked to perform a series of exercises and drills demonstrating knowledge of that subject area.

As each topic is mastered the student is then allowed to proceed to the next level of skill set acquisition. Using this process, a student always has a combination of theory and hands-on experience, which helps ensure practical as well as intellectual knowledge of the material.

Recently, non-traditional entities have started offering network training to our constituency on a for-profit basis. These organizations partner with traditional colleges or other existing facilities to offer their training at an extremely high cost to the student.. We believe that the true cost goes beyond simply the dollars charged and additionally is seen in a loss of the educational quality of the student skill set demanded upon completing the non-traditional training. It is our belief the student leaves those training programs lacking in both practical knowledge, and in the area of being able to apply learned book knowledge into practical workplace skills.

Realizing that we exist in an increasingly competitive market where it has become imperative that we as an educational institute stay focused on tomorrow and utilize consumer-oriented approaches, we now give a more aggressive emphasis to community involvement and staying in touch. All new key initiatives must be designed to address the needs and desires of students, businesses, and cooperative organizations. We have established that in order to prosper, we are mandated to provide our solutions using innovative approaches designed to satisfy the promise of quality education at an affordable price.

In acting in this manner, we feel we can guarantee ever-increasing growth , prosperity, and acceptance, in this time of scarce educational resources.

In order to accomplish our goals we first looked carefully and analyzed the methods these non-traditional entities are using.

We found that the majority of their appeal comes from their flashy Advertising campaigns, which emphasize speed of completion and immediate results. Often we have heard criticisms that these forms of shops simply "teach the test " which results in low long term retention rates and rarely, we feel, truly prepares students for actual challenges encountered once they enter the business world. Far too often theses operations have little, if any, hands on training associated with their solutions, and more often than not they have little or no hands on equipment to use.

Our college has responded to these challenges by embracing modern management initiatives, which have filtered down from top administrative layers allowing better coordination of traditional and non-traditional platforms. With these new guidelines have come organization directives signaling true support of the principal that students are our customers, and many successful business principals apply applying to customer satisfaction must also be applied in educational settings. Using this premise we have analyzed and fashioned a response model designed to counteract our competitions appeal by using our traditional physical structure, and demanding our solutions provide higher levels of satisfaction, retention, and understanding for our students.

We feel this inevitably leads to far more productive outcomes.

After many discussions, we found that by being creative we were able to develop a plan which allows hands on training while also providing students more value. We did this by fashioning a series of programs which parallel some of the non-traditional profit oriented offerings but utilize our existing infrastructure and facilities.

When looking at our programs, notice that we have realized more effective time utilization by extending class times, and by splitting the traditional semester in two "mini" mesters, (1 & 2), allowing for more diversification of course loads while assuring uniform pricing based on hours covered.

Below, you will find a comparison chart showing our traditional degree program (Appendix G) against our non traditional fast track plan (Appendix A-F)

Traditional Networking Curriculum

NETWORKING EMPHASIS	NETWORK CERTIFICATE
FALL (Start)	**FALL (Start)**
CPT 114 Computers & Programming	
CPT 168 Logic & Design	
CPT 176 Micro Operating sys	
MAT 101 Beginning Algebra	
OST 105 Keyboarding	
SPRING	**SPRING**
IST 220 Data Communication	IST 220 Data Communications
CPT 212 Visual Basic Programming	CPT 176 Micro Operating Systems
CPT 124 AS/400 Operation	CPT 114 Computers & Programming
CPT 170 Micro Applications	CPT 257 Operating Systems
MAT 122 Finite College Math	
SUMMER	**SUMMER**
IST 241 Network Architecture I	IST 241 Network Architecture I
CPT 255 Operating Sys Fundamentals	IST 251 LAN Networking Technology
PSY 103 Human Relations	
ENG 155 Communications I	
IST 251 LAN Networking Technology	
FALL (Second Year)	**FALL (Second Year)**
PHI 103 Workplace Ethics	IST 242 Network Architecture II
IST 242 Network Architecture II	
ENG 160 Technical Communications	
CPT 242 Database	IST 243 Network Architecture III
IST 243 Network Architecture III	
SPRING (Second Year)	**SPRING (Second Year)**
CPT 264 Systems and Procedures	IST 260 Network Design
IST 260 Network Design	IST 244 Network Architecture IV
IST 244 Network Architecture IV	IST 253 LAN Services & Support
IST 226 Internet Programming	
IST 253 Lan Services & Support	

Non-traditional Fast Track Curriculum

FAST TRACK SEMESTER			
SEMESTER 1		SEMESTER 2	
FIRST HALF	SECOND HALF	FIRST HALF	SECOND HALF
NETWORK + Certificate			
CPT 257 Operating Systems			
IST 220 Data Communications	IST 251 LAN Networking Technology		
A+ Certificate			
CPT 257 Operating Systems	CPT 209 Computer Systems Management		
IST 220 Data Communications	IST 251 LAN Networking Technology		
Certified Novell Administrator (CNA) Certificate			
CPT 257 Operating Systems	IST 241 Networking Architecture I	IST 242 Networking Architecture II	
IST 220 Data Communications	IST 251 LAN Networking Technology		
Microsoft Certified Professional (MCP) Certificate			
CPT 257 Operating Systems	IST 251 LAN Networking Technology	IST 244 Networking Architecture IV	
IST 220 Data Communications	IST 243 Networking Architecture III		
Microsoft Certified System Engineer (MCSE) Certificate			
CPT 257 Operating Systems	IST 251 LAN Networking Technology		IST 260 Network Design
IST 220 Data Communications	IST 243 Networking Architecture III	IST 244 Networking Architecture IV	IST 253 LAN Services & Support
Certified Cisco Networking Associate (CCNA) Certificate			
IST 201 Cisco Internetworking Concepts	IST 202 Cisco Router Configuration	IST 203 Advanced Cisco Router Configuration	IST 204 Cisco Troubleshooting

BEST COPY AVAILABLE

Realize that our fast track courses, are billed at using our normal semester hourly rates, which normally allow in-state students to enjoy 15 hours, sometimes more, at well below $1000 per semester.

Some of our offerings include our 1 semester – 6 hour – Network Plus (Appendix C), our 1 semester -9 hour- MCP program (Appendix A), or -9 hour- CNA program (Appendix B), and our 1 or 2 semester -12 hr- group which includes CISCO CCNA (Appendix D), or A+ (Appendix E), and even our 2 semester -15 hour- offerings including MCSE (Appendix F).

Even when considering a full 2 semester program, the anticipated cost to the student is expected to be below $2000 , not to mention that this blend of traditional structure, and non traditional time-frames offers hands-on exposure to a multitude of equipment, with far less pressure and less stressful environments.

We feel using this method we can effectively utilize our resources more fully., as you can see by the looking at the previous timetable. Additionally we located, and were able to utilize additional financial sources that helped deserving students enter these programs by locating and receiving NSF funding. This allowed many of our less privileged students to complete their education when it may not have otherwise been possible.

Also we have partnered with major organizations such as Microsoft, to offer additional certifications not shown.

Additionally we have recently become a certified testing center supporting testing from many of these organizations and are expecting to offer programs which coordinate an opportunity (a ticket of sorts) to take many of the tests into course packages from the bookstore allowing disadvantaged students utilizing loans or grants the same opportunity to have a equal opportunity for succeeding and becoming certified in these programs as their more affluent counterparts.

Appendix A

Microsoft Certified Professional (MCP) Certificate

Credit requirements: 9 credit hours

The Microsoft Certified Professional (MCP) certificate courses prepare the student for a network administration profession. It is designed primarily for a student employed or seeking employment in an organization that will use networking in its work environment. This program is designed to prepare the student for the MS Certified Professional certification exams on MS Windows 2000 Server and MS Windows 2000 Network Infrastructure. These courses will provide the student with theory and hands-on administration of a network. All classes in this certificate transfer to the Network Certificate and to the Networking Career path in the Computer Technology Associate Degree program. Students must maintain a C or better in all Information Technology courses to complete the certificate.

Courses in this certificate require prerequisites which can also be satisfied through completion of our **Network +** Certificate program.

First Semester Courses

First Half

IST 251	LAN Networking Technology	3
IST 243	Networking Architecture III	3

Second Half

IST 244	Networking Architecture IV	3
	Total Semester Credit Hours	**9**

IST 243 Network Architecture III

This course covers a cohesive and logical explanation of the IBM-created designs for end-to-end communications network Systems Network Architecture (SNA). Topics include an overview of SNA, its operational characteristics and physical and logical structure. Prerequisite: CPT 176 or CPT 257, and IST 220 or permission of the Information Technology department head based upon the student's previous experience.

IST 244 Network Architecture IV

This course is a study of the installation, use and monitoring of Digital Equipment Corporation's (DEC) network architecture and appropriate operating system. Emphasis is placed on interfacing with the Network Control Program (NCP), defining user interface, effecting inter-task communications and the relationships among various system components. Prerequisite: IST 243

IST 251 LAN Networking Technology

This course focus provides software-specific concepts of Local Area Network (LAN) communication, networking and connectivity. Prerequisite: IST 220 or permission of the Information Technology department head based upon the student's previous experience.

Appendix B
Certified Novell Administrator
Certificate (CNA)
Credit requirements: 9 credit hours

The Certified Novell Administrator (CNA) courses prepare students for a network administrator position. It is designed primarily for a student employed in an organization that will use networking in its work environment. This program is designed to prepare students for the Novell CNA Certification for NetWare 5.0 (course 560). These courses will provide students with hands on administration of a network. All classes in this certificate transfer to the Network Certificate and to the Networking Career path in the Computer Technology Associate Degree Program. Students must maintain a C or better in all Information Technology courses to complete the certificate.

Semester Courses		**Credit Hours**
First Half		
IST 251	LAN Networking Technology	3
IST 241	Networking Architecture I	3
Second Half		
IST 242	Networking Architecture II	3
	Total Semester Credit Hours	**9**

IST 251 **LAN Networking Technology**

This course focuses provides software-specific concepts of Local Area Network (LAN) communication, networking and connectivity. Prerequisite: IST 220 or permission of the Information Technology department head based upon the student's previous experience.

IST 241 **Network Architecture I**

This course is a study of how computer architecture relates to the interconnecting of the various network components, the environment in which the applications processes execute and the overall plan defining services to be provided in a distributed environment. Prerequisite: CPT 114, CPT 176, and IST 220 or permission of the Information Technology department head based upon the student's previous experience.

IST 242 **Network Architecture II**

This course is a study of internal operations of packet switching networks and their implementation, as well as the numerous international standards applicable to such systems. Several models of these networks and current interfaces are covered. Prerequisite: IST 241

Appendix C

Network +
Certificate

Credit requirements: 6 credit hours

Network+ is a CompTIA vendor neutral certification that measures the technical knowledge of networking professionals with some experience in the IT industry. Earning the Network+ certification means that the candidate possesses the knowledge needed to configure and install the TCP/IP client. **Realizing the importance of the Internet** in our information economy, this program is designed to prepare the student to take the **Network +** exam which covers a wide range of vendor and product neutral networking technologies and may also serve as a prerequisite for other independent and vendor-specific IT certifications

In order to be successful, the student is expected to have some prior knowledge of information technology basic terms and concepts, and some degree of hands on experience.

Students are expected to maintain a C or better in all Information Technology coursework in order to receive this certificate.

This course is a one half term only certificate and is also designed to provide a framework for continuing certifications such as A+

Semester Courses		*Contact Hrs*	*Credit Hours*
CPT 257	**Operating Systems**	3	3
IST 251	**Lan Networking Technology**	3	3
	Total Semester Credit Hours		6

CPT 257 **Operating Systems**

This course examines the theories and implementations of operating systems in Information technology.

This course focuses provides software-specific concepts of Local Area Network (LAN) communication, networking and connectivity. Prerequisite: IST 220 or permission of the Information Technology department head based upon the student's previous experience.

Discussion:

Comp TIA (Computing Technology Industry Association)

The computing and communications industries continue to grow at a staggering rate. And with the growth come new rewards and challenges. A global association representing more than 8,000 computing and communications companies, CompTIA provides vendor-neutral standards in certification, e-commerce, customer service, and workforce development to meet these industry-wide challenges. Certification provides credibility, recognition of achievement, and quality assurance providing a competitive advantage in highly competitive technology markets. This advantage applies to both the certificate holder and the hiring organization

Major computing vendors including Novell and INtel incorporate CompTIA certification curriculum in their own certification training.

Appendix E

A+
Certification
Certificate

Credit requirements: 9 credit hours

A+ Certification is a CompTIA-sponsored testing program that certifies the competency of entry-level computer service technicians. Our program is a combination of lecture and hands on training designed to prepare the student to take the A+ test certification test demonstrating proficiency in broad range of hardware and software technologies not bound to any vendor-specific products. In order to be successful, the student is expected to have some prior knowledge of information technology basic terms and concepts, and some degree of hands on experience.

Students are expected to maintain a C or better in all information technology coursework in order to receive this certificate.

Semester Courses		*Contact Hrs*	*Credit Hours*
First Half			
CPT 257	**Operating Systems**	3	3
IST 251	**Lan Networking Technology**	3	3
Second Half			
CPT 209	**Computer Systems Management**	5	3
	Total Semester Credit Hours		9

CPT 257 **Operating Systems**

This course examines the theories and implementations of operating systems in Information technology.

IST 251 **LAN Networking Technology**

This course focuses provides software-specific concepts of Local Area Network (LAN) communication, networking and connectivity. Prerequisite: IST 220 or permission of the Information Technology department head based upon the student's previous experience.

CPT 209 **Computer Systems Management**

This course is a study examining the methods and procedures used in maintaining microcomputer systems. Topics include hardware and software installation, configuration, operations, and troubleshooting with emphasis on A+ certification goals.

Discussion:

Comp TIA (Computing Technology Industry Association)

The computing and communications industries continue to grow at a staggering rate. And with the growth come new rewards and challenges.

A global association representing more than 8,000 computing and communications companies, CompTIA provides vendor-neutral standards in certification, e-commerce, customer service, and workforce development to meet these industry-wide challenges.

Certification provides credibility, recognition of achievement, and quality assurance providing a competitive advantage in highly competitive technology markets. This advantage applies to both the certificate holder and the hiring organization

Major computing vendors including Novell and INtel incorporate CompTIA certification curriculum in their own certification training.

The receiving of A+ certification signifies that the certified individual possesses the knowledge and skills essential for a successful entry-level (6 months experience) computer service technician, as defined by experts from companies across the industry.

Appendix F
Microsoft Certified System Engineer (MCSE) Certificate
Credit requirements: 15 credit hours

The Microsoft Certified System Engineer (MCSE) certificate courses prepare the student for a network administration position. It is designed primarily for a student employed or seeking employment in an organization that will use networking in its work environment. This program is designed to prepare the student for the MS Certified System Engineer certification exams leading to MCSE certification. These courses will provide the student with theory and hands on administration of a network. All classes in this certificate transfer to the Network Certificate and to the Networking Career path in the Computer Technology Associate Degree program. Students must maintain a C or better in all Information Technology courses to complete the certificate.

Courses in this certificate require prerequisites which can also be satisfied through completion of our **Network+** Certificate program.

First Semester Courses

First Half

IST 251	LAN Networking Technology	3
IST 243	Networking Architecture III	3

Second Half

IST 244	Networking Architecture IV	3
	Total Semester Credit Hours	9

Second Semester Courses

IST 253	LAN Services & Support	3
IST 260	Network Design	3
	Total Semester Credit Hours	6

IST 243 Network Architecture III

This course covers a cohesive and logical explanation of the IBM-created designs for end-to-end communications network Systems Network Architecture (SNA). Topics include an overview of SNA, its operational characteristics and physical and logical structure. Prerequisite: CPT 176 or CPT 257, and IST 220 or permission of the Information Technology department head based upon the student's previous experience.

IST 244 Network Architecture IV

This course is a study of the installation, use and monitoring of Digital Equipment Corporation's (DEC) network architecture and appropriate operating system. Emphasis is placed on interfacing with the Network Control Program (NCP), defining user interface, effecting inter-task communications and the relationships among various system components. Prerequisite: IST 243

IST 251 LAN Networking Technology

This course focus provides software-specific concepts of Local Area Network (LAN) communication, networking and connectivity. Prerequisite: IST 220 or permission of the Information Technology department head based upon the student's previous experience.

IST 253 LAN Services & Support

This course focuses on installing, maintaining and troubleshooting Local Area Networks in a lab environment. Prerequisite: IST 243

IST 260 Network Design

This course is a study of processes and techniques required to identify the most attractive design solution of a telecommunication network, combining creativity, rigorous discipline, analysis and synthesis while emphasizing the solution in terms of cost and performance. Prerequisites: IST 243

Appendix G

Traditional Offerings

(Some Revisions Pending)

COMPUTER TECHNOLOGY

ASSOCIATE DEGREE: COMPUTER TECHNOLOGY

Credit Requirements: 75 Credit Hours

This curriculum prepares students for entry-level positions in several computer-related professions. After completing a year in general computer courses, students may select a Career Path in Programming, Networking or Software Applications. Students selecting a career path in Programming will be skilled in COBOL, Visual Basic, RPG and C programming languages, which will provide them the potential to work in positions as business application programmer, database manager, and system analysis. The Networking career path provides students skills in network architecture, network design and LAN services and support. The Software Applications career path provides students skills in popular microcomputer database, spreadsheet, word processing, Internet and graphic software as well as current microcomputer operating systems, making them qualified as microcomputer application specialist. Students must have a C or better in all Information Technology classes to graduate.

APPLICATION CAREER PATH

FIRST SEMESTER (Fall)

CPT	114	Computers & Programming	3
CPT	168	Programming Logic and Design	3
CPT	176	Microcomputer Operating Systems	3
MAT	101	Beginning Algebra*	3
OST	105	Keyboarding	3
		TOTAL	15

SECOND SEMESTER (Spring)

IST	220	Data Communication	3
CPT	212	Visual Basic Programming	3
IST	225	Internet Communications	3
CPT	170	Microcomputer Applications	3
MAT	122	Finite College Math	3
		TOTAL	15

THIRD SEMESTER (Summer)

CPT	270	Adv. Microcomputer Applications	3
PSY	103	Human Relations*	3
CPT	162	Introduction to Web Page Publishing	3
ENG	155	Communications I*	3
IST	251	LAN Networking Technology	3
		TOTAL	15

FOURTH SEMESTER (Fall)

CPT	163	Intro to Multimedia for Web Pages	3
ENG	160	Technical Communications*	3
CPT	172	Microcomputer Database	3
CPT	209	Computer Systems Management	3
CPT	260	Operating Systems & Web Servers	3
		TOTAL	15

FIFTH SEMESTER (Spring)

PHI	103	Workplace Ethics*	3

CPT	262	Adv. Web Page Publishing	3
CPT	264	Systems and Procedures	3
IST	226	Internet Programming	3
CPT	220	E-Commerce	3
		TOTAL	15

*Students interested in the Transfer & University Parallel Programs may substitute the following courses:

MAT 110 College Algebra	for	MAT101 Beginning Algebra
PSY 201 General Psychology	for	PSY 103 Human Relations
ENG 101 English Composition I		
and SPC 205 Public Speaking	for	ENG 155 Communications I
ENG 102 English Composition II	for	ENG 160 Technical Communications
PHI 110 Ethics	for	PHI 103 Workplace Ethics

NETWORKING CAREER PATH

FIRST SEMESTER (Fall)

CPT	114	Computers and Programming	3
CPT	168	Programming Logic and Design	3
CPT	176	Microcomputer Operating Systems	3
MAT	101	Beginning Algebra*	3
OST	105	Keyboarding	3
		TOTAL	15

SECOND SEMESTER (Spring)

IST	220	Data Communication	3
CPT	212	Visual Basic Programming	3
CPT	124	AS/400 Operation	3
CPT	170	Microcomputer Applications	3
MAT	122	Finite College Math	3
		TOTAL	15

THIRD SEMESTER (Summer)

IST	241	Network Architecture I	3
CPT	255	Operating Systems Fundamentals	3
PSY	103	Human Relations*	3
ENG	155	Communications I*	3
IST	251	LAN Networking Technology	3
		TOTAL	15

FOURTH SEMESTER (Fall)

PHI	103	Workplace Ethics*	3
IST	242	Network Architecture II	3
ENG	160	Technical Communications*	3
CPT	242	Database	3

IST	243	Network Architecture III	3
		TOTAL	15

FIFTH SEMESTER (Spring)

IST	244	Network Architecture IV	3
IST	260	Network Design	3
CPT	264	Systems and Procedures	3
IST	226	Internet Programming	3
IST	253	LAN Services & Support	3
		TOTAL	16

*Students interested in the Transfer & University Parallel Programs may substitute the following courses:

MAT 110 College Algebra	for	MAT101 Beginning Algebra
PSY 201 General Psychology	for	PSY 103 Human Relations
ENG 101 English Composition I and SPC 205 Public Speaking	for	ENG 155 Communications I
ENG 102 English Composition II	for	ENG 160 Technical Communications
PHI 110 Ethics	for	PHI 103 Workplace Ethics

PROGRAMMING CAREER PATH

FIRST SEMESTER (Fall)

CPT	114	Computers & Programming	3
CPT	168	Programming Logic & Design	3
CPT	176	Microcomputer Operating System	3
MAT	101	Beginning Algebra*	3
OST	105	Keyboarding	3
		TOTAL	15

SECOND SEMESTER (Spring)

IST	220	Data Communication	3
CPT	212	Visual Basic Programming	3
CPT	124	AS/400 Operation	3
CPT	170	Microcomputer Applications	3
MAT	122	Finite College Math	3
		TOTAL	15

THIRD SEMESTER (Summer)

CPT	213	Advanced Visual Basic	3
CPT	255	Operating System Fundamentals	3
CPT	115	COBOL Programming I	3
ENG	155	Communications I*	3
IST	251	LAN Networking Technology	3
		TOTAL	15

FOURTH SEMESTER (Fall)

CPT	215	COBOL Programming II	3
PHI	103	Workplace Ethics*	3
ENG	160	Technical Communications*	3
CPT	242	Database	3
CPT	209	Computer Systems Management	3
		TOTAL	15

FIFTH SEMESTER (Spring)

PSY	103	Human Relations*	3
CPT	121	RPG Programming I	3
CPT	264	Systems & Procedures	3
CPT	234	C Programming	3
IST	226	Internet Programming	3
		TOTAL	16

*Students interested in the Transfer & University Parallel Programs may substitute the following courses:

MAT 110 College Algebra	for	MAT101 Beginning Algebra
PSY 201 General Psychology	for	PSY 103 Human Relations
ENG 101 English Composition I and SPC 205 Public Speaking	for	ENG 155 Communications I
ENG 102 English Composition II	for	ENG 160 Technical Communications
PHI 110 Ethics	for	PHI 103 Workplace Ethics

NETWORKING CERTIFICATE

Credit Requirements: 30 credit hours

The Network Certificate prepares a student for a network administrator or network engineer position. It is designed primarily for a student employed in an organization that will use networking in its work environment. This program of study is designed to prepare the student for network certification. This certificate program starts with the spring semester. All classes in this certificate transfer to the Networking Career Path in the Computer Technology Associate Degree program. Students must have a "C" or better in all Information Technology classes to graduate

FIRST SEMESTER (Spring)

IST	220	Data Communications	3
CPT	176	Microcomputer Operating Systems	3
		Or	
CPT	257	Operating Systems	3
CPT	114	Computers & Programming	3
		Total	9

SECOND SEMESTER (Summer)

IST	241	Network Architecture I	3
IST	251	LAN Networking Technology	3
		Total	6

THIRD SEMESTER (Fall)

IST	242	Network Architecture II	3
IST	243	Network Architecture III	3
		Total	6

FOURTH SEMESTER (Spring)

IST	260	Network Design	3
IST	244	Network Architecture IV	3
IST	253	LAN Services & Support	3
		Total	9

Preparing Tomorrows Teachers to Use Technology Implementation Grant For The Years 2000 – 2003: Raising The Technology Learning Curve by *Energizing Teaching to Empower Students through Emerging Technologies*

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Abstract

This paper presents program goals implemented through a Preparing Tomorrow's Teacher's to Use Technology PT3 implementation grant at Clarke College. One goal is to design a "school" environment in real and virtual spaces to transform learning throughout the liberal arts and education departments. These new "school environments" provide space where new knowledge is created together as a community of learners. A second goal is to build a web-based virtual space to facilitate communication between and among our learning communities: K-12 students and teachers, teacher preparation students, and liberal arts and education faculty. This virtual learning space provides tools for "digital" exchanges using email, the Internet, and the Iowa Communication Network (ICN). A third goal is to create an Alternative Licensure Teacher Preparation Program. This graduate licensure program offers technology learning opportunities to prepare re-entry teachers, mid-career changers, and out of field teachers for the 21st century workplace.

Part I. PT3 Program Goals

This paper is a presentation of program goals of Preparing Tomorrow's Teachers to Use Technology (PT3) implementation grant. Clarke College, together with its partners, the Catholic Schools of the Archdiocese of Dubuque and the Iowa College Foundation, has created a program to improve instruction of our pre-service teachers through effective use of information technologies. Components of this program incorporate new teaching paradigms implemented through program goals and a technology-learning plan.

One component of our program is the creation of "school" environments in real and virtual spaces to transform learning and teaching. These new "school environments" are where students and teachers explore, discover, and create new knowledge together as a community of learners. This component includes a program for designing strategies for infusing information technologies throughout liberal arts and education coursework. Faculty development programs provide instructional training on techniques for creating "smart technology" environments.

A second component is the building of a web-based virtual space to facilitate communication between and among our learning communities: K-12 students and teachers participating in Clarke's education program, pre-service teachers, liberal arts and education faculty. This virtual learning space provides tools for "digital" exchange of information and resources through email, the Internet, and the Iowa Communication Network (ICN).

A third component is the establishment of an Alternative Licensure Teacher Preparation Program. This graduate licensure program provides learning opportunities to prepare re-entry teachers, mid-career changers, and out- of- field teachers for the 21st century workplace.
Grant goals form the framework for implementation of program objectives, activities, training, and support to transform learning environments throughout liberal arts core courses and the teacher preparation program. They are as follows:

Goal 1: To create innovative improvements in our existing liberal arts and teacher preparation program by enhancing coursework and student activities through transparent use of technology resources.

Goal 2: To create a learning exchange to facilitate digital connections between and among Clarke College faculty and K-12 teachers and students in our Archdiocesan Catholic Partner Schools.

Goal 3. To create a new graduate Alternative Licensure Teacher preparation program for preparation of re-entry teachers, mid-career adults and out-of field teachers.
Continuous achievement of performance objectives sustain a climate for college faculty, students, K-12 teachers and students to facilitate building collaborative models for exploring "learning how to learn" together through transparent use of information technologies.
Ongoing project activities exemplifying innovative improvements are:

1) offering one-to-many and one-to-one learning opportunities for training faculty,

2) developing techniques for strategizing support to liberal arts and education faculties for integrating new models of instruction into coursework,

3) providing student training in technology skills through the Student Technology Assistants Plus+ (STA+) Program to extend technical support to faculty,

4) creating an online structure for collaboration and community building where students and teachers connect, communicate, and share resources through a web-based digital exchange,

5) developing a telementoring program as a vehicle to sustain support for first-year teachers during their critical first year of teaching, and

6) creating an Alternative Licensure Teacher Preparation Program to meet the critical shortage of K-12 teachers in Iowa as well as to prepare new teachers with technology rich models for teaching and learning.

A Technology Education Center (TEC) on campus provides space for one-to-one and many-to-one training sessions for faculty. This center is equipped with hardware and software to provide opportunities for learning new technologies, such as, high-end computers for creating multimedia projects, scanners, digital video cameras, and content specific software appropriate to education and liberal arts courses.

Additional learning opportunities for faculty are provided through an "Anytime, Anyplace Technology Learning Space" (AATLS). This space consists of a wireless mobile unit containing 15 laptop computers for teacher training sessions. This AATLS provides a flexible, hands-on learning/training space using portable laptops and a multimedia projector. A technology resource specialist utilizes these spaces offering designing and planning opportunities for faculty. STA+ students are trained to assist the technology resource specialist in extending support across the liberal arts and education departments.

Our project creates innovative models to improve the current teacher preparation program. The National Educational Technology Standards (NETS) aligned with the Interstate New Teacher Assessment and Support Consortium (INTASC) standards provide a framework for assessment of pre-service technology skills. These standards are incorporated into education department course syllabi to promote a seamless integration of technology into all education courses.
The following vignette is one example of a learning model for our teacher preparation students exemplifying one best learning practice using technology. Three secondary education/biology majors completed research on types of authentic prairie plants and animals native to Iowa prairies. Students used electronic data base programs as well as PowerPoint and digital imaging processes to produce their electronic product. They presented their research results to Clarke College Administrators and requested a piece of land on the Clarke campus to plant a prairie. This prairie will become a permanent authentic learning environment for Clarke students and K-12 students in Dubuque.

Learning with technology extends from the Clarke Campus to our two Archdiocesan Professional Development Schools where pre-service teachers are placed for field, student teaching, and clinical experiences. The Professional Development School was created in collaboration with St. Mary's/St. Patrick's and St. Anthony's Catholic Schools in the Archdiocese of Dubuque At the professional development site Clarke students attend college classes and collaborate with faculty and K-12 teachers "on-K-12-site" to practice a seamless integration of technology within the learning environment.

Pre-service elementary teachers bring laptop computers into the K-8 environment to implement strategies for incorporating technology into the curriculum. Students use programs, such as, Inspiration, HyperStudio, Microsoft Office Suite, and the Internet to produce new learnings through effective uses of technology.

New "digital" web based communication exchanges facilitate and maintain communication between and among members of our learning communities: Clarke faculty, K-12 teachers and students, pre-service and first year teachers, and teacher mentors. Examples of digital tools utilized are: email, the Internet, and the Iowa's Communication Network (ICN). New web applications support communication between and among our learning communities through the creation of discussion forums and chat rooms. This virtual space showcases technology rich learning processes and products created by Clarke education students, education and liberal arts faculty and K-12 teachers. Projects can be accessed at the following url: http://www.clarke.edu/pt3.

Another project is the creation of a new graduate Alternative Licensure Teacher Preparation Program. The goal is to recruit and prepare new teachers through a program enriched by technology instructional models. This program offers re-entry teachers, mid-career adults, and out of field teachers a technology rich program to prepare them for the 21st century workplace. The Iowa Communication Network (ICN) is one technology utilized for course delivery. This system provides a two-way audio/video course delivery utilizing ICN classrooms across the state of Iowa. This program description is explained in part II of this paper.

Part II. Alternative Licensure Program

Justification for Program

It is projected that 40% of Iowa's teaching force will retire within the coming decade. Our current teacher education programs are not graduating sufficient teacher candidates to make up this loss (Heldt, 2000). During the summer of 2000 the Iowa State Department of Education proposed rules for an alternative preparation license and urged colleges within the state to design programs that would meet these requirements and also attract a broader audience.

The development of alternative routes to teacher certification is a trend that has grown steadily since the 1980's in this country, particularly in states that faced fast-growing populations and teacher shortages earlier than Iowa. In 1999, forty states reported having alternatives to approved college teacher education programs for certifying teachers (Feistritzer & Chester, 2000).

Determination of Target Population

National statistics indicate that prospective teacher candidates are to be found among people who already have degrees in fields other than education, people older than the traditional 18-22 year old college student cohort, people who are changing careers, former military personnel, and among ethnic and racial groups that are currently underrepresented in our teaching force (Feistritzer & Chester, 2000). Of 63 non-traditional aged (over 24 years) daytime students at Clarke College (5% of the student body), 27 (22.5% of the non-traditional group) are currently enrolled in our teacher preparation programs, but a number of them have expressed the difficulties they face trying to maintain their other job and family responsibilities and also attend classes given in our usual daytime format. (Clarke does have 227 non-traditional students participating in evening classes in fields other than education.) We anticipate more adult students being interested in teacher preparation if the scheduling and course delivery methods meet their needs.

Investigation of Viable Models

Roth as quoted by Turley and Nakai (2000), noted that alternative routes to certification typically seek to fast track or circumvent traditional university-based teacher education. Some see alternative routes as a serious threat to university sponsored professional preparation. Still others maintain that the issue is not over professional preparation per se but over the timing and institutional context for teacher preparation. Programs are operated by the local school district, by state departments of education, and by colleges and universities. It is our contention that it is possible to develop programs that provide high quality professional preparation and provide that training through means and with schedules that are accessible to adults with family and job responsibilities.

As a college, we determined that the model that appeared most likely to gain approval by our institution and by the State Department of Education of Iowa would be grounded in the competencies that a beginning teacher needs in order to teach and manage a classroom environment effectively and that would meet the requirements of the state's proposed rules for alternative preparation. The core of knowledge provided to our current pre-service teachers had to be made available through delivery systems and on a schedule that would serve the new populations we were targeting.

Inclusion of Stakeholders

At this point, contact was made with stakeholders in this endeavor. Conversations were held with directors of personnel in the local public school district; the superintendent of the Archdiocese, a parochial school district of ten K-8 schools and one high school; the teacher representative of the local teacher's union, and a list of key personnel in schools within a nearby three-state region. An informational meeting was held with administrative and student services departments on our campus whose buy-in and support is crucial to the success of such a program. These stakeholders included the academic vice president, the vice president for adult and continuing education, the vice president for college advancement, the vice president for business and finance, the public relations department, the grant-writing department, and the library. The needs of this program for distance, online, and evening services such as admissions, registration, fee-paying, financial aid, academic and career advising, library and bookstore services were addressed. The stakeholders expressed support and appreciation for being brought into the program early in its development.

Design of Proposed Program

A first decision was to target adults who already have a bachelor's degree. Therefore, rather than develop another undergraduate program, ours would build on their prior education and provide both a master's degree and the competencies necessary for teacher licensure in Iowa. The education core courses were re-envisioned at a master's level.

Both elementary and secondary education candidates would take the six three-credit-hour courses that form the education core. The titles of these courses and the key topics for each reflect the mission of the college to develop personally and socially responsible individuals. They include: Introduction to Reflective Teaching, Active Learning: Constructing Knowledge, Teaching in a World of Diverse Learners, Balanced Assessment and Issues in Evaluation, Managing the Classroom Environment for Effective Instruction, and Teaching for Social Justice in a Multicultural World.

After completing the education core, the elementary and secondary tracks would diverge. Elementary majors would take two intensive three-credit hour curriculum and instructional methods courses. Secondary majors would take a general middle school/secondary school methods course followed by a discipline-specific methods course dealing with music, art, physical education, laboratory science, foreign language, English or history methods related to the student's content area.

The optimum timeline for students in this program would be eighteen months, completing the core and methods courses in fall, spring and summer semesters. One semester would remain in which the candidate would do a sixteen-week, all day internship or student teaching requirements for which twelve credit hours would be granted.

The delivery method(s) envisioned for the first twenty-four credit hours include heavy use of WebCT courses with strongly interactive elements including scheduled chat rooms and listserv, email, or forum exchanges of ideas, reflections and beliefs regarding course readings and online lectures. To simulate some of the classroom observation and participation that the best practices teacher preparation programs provide a collection of video clips of exemplary teaching practice in action will be utilized. Students will develop lesson plans to provide instruction similar to the best practices videos. In addition to web and video, a third technology, two-way audio-video classes will be used to allow students to participate in and view peer teaching in which students teach their classmates. Two-way audio-video class meetings using the Iowa Communication Network (ICN) may be used to introduce courses and to build community among the cohorts of students who will continue through this entire program as a group.

Partnerships with schools in communities where our students reside will aid us in providing opportunities for a minimum of forty hours of live classroom experience prior to the internship. Forty hours is the current Iowa state requirement. This program will of necessity have to be flexible in finding alternative ways to meet the requirements and develop the needed teaching skills.

Funding and permission to provide internships with a stipend to cover cost of living for the sixteen-week final semester are being sought. A strong mentorship with a teacher in the school where the internship takes place is a requirement. Clarke faculty or Clarke-hired adjunct faculty will serve the same role they currently fill in student teaching, including weekly observations of the student teacher or intern.

This proposal is being evaluated by the Clarke Education Department, the Clarke Educational Policy Committee, and will then be taken to the Iowa State Department of Education for program accreditation.

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Web Abroad:
Sharing the Learning, Staying in Touch

Using web pages as a method of presentation for study abroad to reinforce and enrich learning, informing family, friends, and others about experiences, and providing a reference for future trips.

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ABSTRACT

This presentation will lead you through incorporating a website into a student abroad program
to enhance the learning of the students on the program,
to share this learning with friends and future programs, and
to communicate with family and friends.

Sites include weekly updates with annotated photos of locations and events, student-journal vignettes, and other materials and web links related to the program.

We will share the rationale and benefits as well as recommended steps to make this program a success. And NO, those on the field program do not need to know any web tools! Training is minimal. While "staying in touch" was an instigating motive for the sites, a larger benefit is for the students to share their experiences in "real time." This not only helps others experience the adventure, but also enriches the abroad students' learning. Nothing helps you learn like teaching someone else.

INTRODUCTION

Today many of us are searching for meaningful ways to take advantage of technology to make both teaching and learning relevant and engaging. A side benefit of this effort is that both the student and faculty learn new approaches and skills. We have seen all of these results with the Abroad web pages at Principia College.

As with many of the technology efforts today, a student led the way in our webcasting. In 1998 a senior with a special major in graphics and web design was accepted for Principia's biology Study Abroad program to Nepal. His capstone project was to put on the web a National Geographic type report of this trip. The following spring, I was accepted on the China Abroad program as the assistant. Where Cam Martindell launched us into this venture, I worked with out web team to set up a system that could be sustained and supported over time. The system adjusts to each program and has generally proven successful in meeting our goals.

After a brief overview, we will describe how to accomplish each phase of the project. We will share why we do this and how we make it a success, including the steps needed in working with those on the study abroad and the resources needed "at home" to support that activity. Here are the basic steps:

I) Pre-trip Planning – this takes the most time and effort on everyone's part
    A) Determine with the faculty member that the group wants a website as part of their program; outline faculty and student commitment, the site focus, and site components.
    B) Design the website, collect student bios/photos, itinerary, links, and other content materials.
    C) Train an abroad person on the camera, file management, and sending process.
II) Trip Updates – each student about 3 hours one time during the program
    A) Locate transmission points.
    B) Select photos and creating captions.
    C) Select and edit journals.
III) Post-trip Wrap-up – minimal time and effort
    A) Clean up site; add final papers, program evaluations, & PowerPoint post-program show.
    B) Press CDs for participants.

Why: Rationale and Benefits – Academic and Otherwise

It is important to be clear with all three constituencies – those going on the trip, the office that manages that activity, and the web support group – that this effort should have an academic purpose and focus. There is a strong tendency for the social aspect to take over (head shots of their friends) and that approach has neither the value to the program or student, nor the justification for the effort. It becomes the latest toy in the technology tool bag and with no real pedagogical purpose: it will (and should!) wither.

Webcasts hook the students and give them a context or medium in which they can share what they are learning with a wide audience; they give students a format in which to overlay their classroom learning with their on-location experiences and observations. Academic webcasting fosters communication, team building and problem solving skills. Students can share who they are, where they come from, and their purpose on this abroad with the people they will be meeting. Even the *process* of sending photos, captions and journal entries back to Principia for posting on the web can be used to support the academics. For example, vocabulary development and conversation is enhanced as students navigate their way to Internet cafes and learn computer lingo in their host countries language.

ACADEMIC BENEFITS - Pre-trip activities to augment the academic program

- ***Links to resources***, including maps and topics – political, economic, etc. – that are the focus of the trip are important. Cultural and historical sites are often useful for general student background as well as for their projects. Both the content and the process of evaluating web resources are valuable for the student. These links add a richness to the site that make it a valuable resource for the future as well. Frequently, the Library has a staff member or resources for assisting with locating and evaluating web sources.

- Including student ***biographies*** and/or resumes is an activity that pushes the student to self-awareness, professional development, and helps them put this experience in a broader context. Frequently, these include student goals for the study abroad and are helpful in evaluating the experience later. These personal biographies also can be used as a point of communication between our group members and their host families and institutions. When using formal e-resumes, we use our Career Center to assist with this aspect.

- Student ***projects*** – research papers, artwork, poetry – add depth to the site. Using the website for posting of abstracts for the study abroad projects helps the student to focus their efforts. Webcasting an academic program encourages students to do their best work. Students really have to KNOW their subject in order to reason through the best way to articulate and share on the web what they are learning.

- Including on the site ***photos of locations and housing*** where the students will be visiting, interning, or studying helps familiarize them with the new culture and environment. They function more smoothly and some of the uncertainty of the mechanics of the experience is alleviated. Some of our professors include photos or video taken on their planning trip so that the students can recognize their hotel or dorm, train stations, local restaurants, and even what to expect on a typical menu.

ACADEMIC BENEFITS - During the trip: journals and photos with captions

- It is important to emphasize that though we encourage inclusion of ***photos*** of members of our group, it is best to include some historical, cultural, or other component in the photo that adds to the academic content of the site. ***Captions*** can aid in that focus and reinforce learning as students check details on sites or events in the photos.

- Student ***journals*** add a wonderful richness to their experience. Sharing these more subjective, personal perspectives helps them discover meaning or themes in they are experiences. They have the opportunity to gain insight and go beyond just recording. Often it is the time to clarify questions if no sense or meaning seems clear. Rather that just evaluate their experience at the end of the abroad, their journaling, when reviewed later, is a record of growth. Sometimes it is a source for nuggets for later writing. These journals also add to the vividness of the site for others on the Abroad and for those viewing it from home or later. These have been some of the best pieces of our websites, but the faculty member needs to be committed to this activity. They may need to make it a requirement and the editing for the website is important.

ACADEMIC BENEFITS – After the trip: completed papers, student evaluations

- Posting final ***research papers*** can be an impetus to quality work. The student can reference this in a resume. As resumes more frequently are electronic, linking to this can be a simple, effective way to highlight an experience.

- ***Evaluating*** whether they realized their goals set forth before they left or what they gained or learned from this experience is a reflective activity that may help crystallize ideas or personal or interpersonal growth.

OTHER BENEFITS

- The students that work on the website gain ***valuable technology experience*** in web development. This includes the minimal impact on those on the Abroad and the more extensive experience of the student web developers on campus.

- ***Staying in touch*** is a vital part of this website. Parents and friends are reassured and supportive when they can "see" their student on a regular basis. Even today with better communication because phones and email are so easy to access (even in Mongolia the cyber café was easily accessible), the website made those "back home" feel more in touch with the travelers' experiences. It often provided "talking points" for family. We do hear from parents regularly about how much each of the sites means to them – emergency or not!

  While our group was in Beijing, the US military bombed the Chinese embassy in Belgrade. Our parents were extremely concerned about our safety. News reports showed rioting at the US Embassy in Beijing. Quickly, we were able to get on our website a flashing message that we were safe and on the train to Mongolia. We could also provide a link to more in-depth comments from the program director describing the real conditions in Beijing. We had a similar situation with a group that was in Kyoto, Japan during one of their earthquakes.

- The ***CDs*** that the students take with them are a ***permanent record*** of their experience. Often we include all the photos taken and not just the ones on the website. If they do a PowerPoint presentation for sharing with the community after their return, we put that on the CD as well.

How: Working with Faculty and Students

PRE-TRIP ACTIVITIES - Faculty Planning Session

The first meeting should be with the faculty member. Most faculty are willing participants in webcasting once they understand they will not need to be involved in the actual coding of the pages and the see the academic opportunities this activity affords. At this initial session, we share past experiences from our perspective and generally outline the benefits cited earlier. We evoke from the professor ways that she would like to utilize this resource and stress the academic direction we hope this takes. Often this first meeting plants a seed that can be developed later in the site design meeting.

We also outline what the expected commitment might be:

- Collaboration on site design, as well as any content collection, must be done ***before*** the group leaves. Usually a small group of students or a single student rep takes this on.
- Student and faculty bios are homework assignments and can vary with the professionalism and length desired. These must be done ***before*** the trip.
- Photos, captions, and journals must be selected, organized, edited, and sent weekly ***during*** the trip. Each team of students takes photos and does captions for only one week on the Abroad. Other than taking photos, the time commitment is about 2-3 hours a week for the team. Count on an hour for sending that week's photos as email attachments.

The webcasting process runs more smoothly with faculty support, even if the professor is not directly involved. Reasons cited by the few faculty not wishing a webcast are the distraction from abroad activities and continued connection to "home." In our case, it is important not to coerce the professor into participation. It is helpful for all to understand the role of the assistant.

PRE-TRIP ACTIVITIES - Student Planning Session

Once a professor decides to support this activity, we then present the idea to the students. At one of their early group meetings the quarter before they leave, we share much of the same material that we shared with the faculty and add any ideas the professor has incorporated. After setting some guidelines on what we can and can't do, we elicit from the students what they would like to include. This generates interest and commitment to the project. Most of them are familiar with past Abroad websites and are eager to be part of the webcasting. The tendency is usually to include too much rather than lack of interest. It is important to help them be realistic in what they can accomplish. The web designer should be at this meeting. In our case, he frequently runs this part of the session. Have a chalkboard, whiteboard, or large easel pad for planning purposes. It's helpful to have a computer and projector to go through some of the past sites.

At this point, to simplify communication, we ask for volunteers to be responsible for the web part of their Abroad. This small group of 1-3 students becomes the point of contact for the web designer. They work with the web designer on the site design and content. They take bio photos, gather site graphics, and collect the links, bios, and research abstracts from the group. They are also responsible for learning and training on the digital camera as well as the file management of the photos and captions. They are usually the ones that send the weekly email.

This session is the easy part. The follow-through is a bit more challenging: no surprise there! Setting firm deadlines helps. Tying it to the academics (and thereby grades) also helps.

TRIP ACTIVITIES

During the Abroad, the primary activity is managing the incoming photos, captions, and journals and getting them on the site. Here are some of the challenges:

- Poorly labeled photos and captions so you can't match them up.
- Inadequately proofed captions and journals with misspellings and poor grammar.
- Unrealistic expectations for initial photo setup. It takes about eight hours of student worker time to get the photos on the website the first time. There are simple ways to set up photos that would take about 2 hours, but for easy navigation and a professional look, we spend more time at the beginning to set up these pages.
- Unrealistic expectations on turn-around time. The photos come in at the end of a week, and then it may be late the following week before they are up.
- Too many photos or other changes to the original plan. We try to "just say no" to these but in reality we almost always do some site adjustment once the group is in the field.

On occasion, it may be helpful to arrange a conference call with the web designer, the professor and the Abroad web team, and the program manager to iron out details. One 10-minute session can eliminate a barrage of email and confusion, while eliminating or cutting down the time delay for changes.

POST-TRIP ACTIVITIES

Getting the last set of photos on the site as well as final papers and evaluations take real dedication from the faculty and students. Once the trip is over, it is hard to continue with developing the site. Some leverage can be gained by requiring that all material be turned in before they can have the CD with the site and the extra photos.

We purchase our CDs through the purchasing department and the OSP student worker creates the CDs. Since these are small groups (less than 25), we do copy the CDs one at a time in the CD-Writer built in to the computer. We use Adaptec's Easy CD Creator software. The process takes about 4 hours.

How: The Web Team – Training and Managing

Because of the vast differences and the number of permutations in technology support and web support for academic programs, the best approach here is to share with you what we are doing at Principia and how it works. You can then adapt this to your institution.

We have two web teams at Principia.

- The Publications Department manages a set of pages that meet their criteria for focus (alumni, prospective students, development, etc.) and functionality. There are no students in that group. Their entry point is www.prin.edu.
- We also have a web team in Computing and Information Systems (our IT department) that

manages and develops content relating to current students, parents, faculty, and staff. A large component of what they do is support for academics. However, they also provide non-academic web content for their constituencies as well. On campus, the entry point is PrinWeb. This group is the one that manages the Abroad content. The address off campus is www.prin.edu/abroads.

STUDENT WORKERS

Students are our most valuable resource – and we theirs! We provide on-the-job training and experience and they provide cheap labor. We have about three students each hour doing various web projects for us. Our annual budget is about $20,000 for student wages. We incur about another $5,000 in expenses in wages that other departments pay for, but we manage the student. The student web workers make about $6.00/hour. In most cases, the work experience and reference for future employment far outweigh the low student wages.

All of our student workers know HTML and have experience when they come to us – some more than others! Both our Computer Science and Studio Art/Graphics Design departments incorporate some web design in at least one of their courses. Most of our students have come from one of these programs, though some are self-taught. We encourage students that are serious about this line of work to take courses in both departments. It is important for us to have students strong in database and programming skills as well as those grounded in graphics design and, ideally, each student should have both. It is also important to hire freshmen through seniors working for us – to be developing their talents for the future.

For an Abroad website, it takes 10 hours per week for the 10-week quarter before the trip to design and build the site. For us, that is one student working a 2-hour shift each day for 10 weeks. Sometimes, the next quarter (during the first weeks of the Abroad), the student worker that designed the site will need to make adjustments and minor design changes and assist with the initial loading of content.

Once the Abroad is under way and the photos and other content are coming in, the Office of Special Programs (OSP) that manages our Abroads has one student worker for each program that add the content to the site(s). They work in the OSP office and have the needed equipment there (see below). The Webmaster for academic services recommends, trains, and supports them though they are managed by the Director of Abroad Programs.

DESIGN

We have come up with a design that allows for flexibility and yet provides a structure so that we are not completely starting over for each trip. The general layout, navigation, and the database for the photos are reused and modified for each program. We have standard content for each trip.

- Program Description: this comes from OSP and is always already created as part of the planning for the Abroad.
- Itinerary: this also comes from OSP and is completed prior to the website going live.

- Bios: these need to be completed by the faculty and students. The San Francisco Field Program uses professional resumes. Others have used free-form descriptions. Some have been yearbook-type lists that give facts about the person.
- Updates: these are the weekly photos and journals sent back from the field.
- Other material: ***optional*** – links, maps, abstracts, etc. determined by each group.

We work with the Abroad web team for the look and feel of what they want. This is a valuable experience for the ***student*** building the abroad site. Analysis, listening, and implementation of client visions are part of what they are learning – not just the fun tools. There are several cycles of develop, present, and modify that occur between the Abroad group and the web design team.

We frequently work toward a theme that runs throughout the site – Japanese characters, the rearview mirror of a bus. It is essential to have solid graphics design talent or training when working on the original design. Depending on the abroad, we add links between bios, journals, papers, internships, etc. Again, some redesign frequently occurs once the group is actually using the site.

Equipment

ON THE ABROAD

- ***Camera***: The digital camera is the only required piece of equipment. It should have with it two spare sets of rechargeable batteries, a separate battery charger with power adapter for your location, and two spare storage media. It is nice to have a spare battery charger. We had one blow out with the power fluctuations in Mongolia.

  If you do not take a laptop, the Sony Mavica series cameras record on to floppy disks or CDs. These can then be put into most computers to send the photos. We use the Olympus D450Zoom with 16M SmartMedia cards and Olympus batteries and charger. This camera is smaller and easier to use, but it almost requires a laptop for uploading/sending the photos.

- ***Laptops***: We use laptops on our Abroads; typically, each trip takes two laptops; some also take a printer. Often several students have their own laptop as well. The communication card should have a combo card that has both a modem and Ethernet connection.

- ***Internet Connections***: You need to find locations overseas from which to send the photos and other materials home. Your hosting organization can usually assist with this. It is helpful to locate Internet cafes in scheduled locations. Some of them will not let you put a disk into their computers because of virus issues. Some will let you directly connect your computer to their network. Check on costs. It usually takes about 20 minutes on-line to send 12-20 photos. It is helpful to have both a Yahoo and Hotmail account: if one system is down or very slow, you can use the other one. At last check, Hotmail let you have an unlimited number of attachments on a given email with a 2M-size limit, which is helpful when sending 12-20 photos.

Hardware: Mac G3; 128 RAM; 19"monitor, drawing tablet, scanner
Windows 2000 PC, 256 RAM, 19" monitor, drawing tablet, scanner
Software : Photoshop, Bbedit, Dreamweaver, Flash, Homesite

Conclusions

This project has value on several levels.

1. Faculty add to their store of technology incorporated in their coursework, enhancing the learning and teaching experience.
2. Faculty use these sites as good resources for future trips.
3. Abroad students make effective use of technology in communicating and reporting. It is a medium they relate to and that engages their interest.
4. Student workers use this as a real-world opportunity to utilize and develop skills and talents.
5. Students (Abroaders and workers) have this site as a resource or reference for internships or employment.
6. Parents and friends use this to stay in touch and vicariously participate in the Abroad.
7. Administrators and trustees find this is a great way to inform the public and prospective students about Principia College.

We continue to try to increase the academic nature and content of webcasting. Faculty and students are our greatest resource in this area.

ONLINE LEARNING AT MERCER WITH WEBCT

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IN THE BEGINNING

The Information Technology staff at Mercer had reviewed several online course management tools prior to adoption of WebCT. Faculty had taught one or two courses using Embanet. We had representatives from other vendors who demonstrated their products. In 1999, Mercer selected Campus Pipeline as our Web portal software because of its integration with the SCT administrative software we use. Reviews of software capabilities, ease of use, price, and integration prompted our choice of WebCT. In the spring of 2000, we downloaded the trial version 2.1 to a small server to play with, and one staff member loaded it on her personal server in order to learn how it works. In June, 2000, we contracted with an Instructional Design and Technology Specialist from the University of Georgia to teach a two-day WebCT workshop for the Academic Computing staff, the Director of Web Management, and five select faculty who were expressing an interest in online teaching and learning. That workshop gave us the jumpstart we needed to begin creating our demo courses and training materials. In July, 2000, the Director of Academic Computing submitted a statement of online learning goals to the Office of the Provost and the Associate VP for Technical Services. In that report he outlined a plan for establishing an online learning initiative at Mercer. The following pages represent the thrust of that outline with slight modifications.

INTRODUCTION

In order for Mercer University to be effective and successful in its approach to Web-based online learning, the University must provide a faculty development program that fosters experiential, collaborative learning. As the University embraces technology mediated learning, it must concentrate on a comprehensive approach to development of Web-based courses. There are several major factors to be considered, such as: (1) level of Web integration, (2) personalized courses, (3) learning strategies, (4) hands-on student experiences, (5) assessment methods and tools, (6) technical support and consultation, (7) selection of course development and management tools, and (8) security and copyright issues.

LEVEL OF WEB INTEGRATION

There are basically two levels of Web integration for online courses. They are the Web enhanced course and the fully integrated online course. The fully integrated online course can be either instructor led or learner led. In the instructor led courses, the instructor and learner interact during the term of the course. In the learner led courses, the learner works through the course independently.

Web Enhanced Course

In a Web enhanced course, the faculty generally post such course objects as the syllabus, homework assignments, special documents, URLs for research, and similar items on the Web for student access. Completed homework assignments are delivered electronically to a course drop box. Quizzes, exams, surveys, and other forms of assessment can also be handled electronically, and students would be able to view their course progress on a daily basis by logging into their respective course Web sites. Students can view their individual grades online if allowed by the instructor. The course design might also include a list serve through which the faculty and students can post questions, comments, and threaded discussions. Classes continue to meet at the prescribed time and place, based on the regular or modified class schedule, and the Web is used to support the learning process.

Fully Integrated Online Course.

In a fully integrated online course, all course related activities are delivered and accessed via the Web. In addition to those items described in a Web enhanced course, the entire body of course materials, activities, contacts and communications are handled through Web access. Quizzes, exams, surveys, and other forms of assessment are delivered and completed electronically, and students are able to view their course progress on a daily basis by logging into their respective course Web sites. There are no class meetings for faculty and students to attend.

Instructor Led Course

The instructor manages the course entirely online with minimal or no face-to-face contact with the students. Discussion groups, chat rooms, group and individual projects are all be handled electronically. Some of the course activities might be accessed synchronously by use of a chat room, but the majority of the activities are most likely accessed asynchronously. The asynchronous method allows students to access the learning materials at their convenience rather than on a specified time schedule. By using a course management tool such as WebCT, the instructor is able to require assignments to be submitted on or by specific dates and can also make activities and exams available only on specified dates and times.

Learner Led Course

In a learner led course, the instructor installs all the course material to the course Web site but has no interaction with the learner during the course term. After registering for the course online, the learner is able to login to the course at anytime and work independently. All course assignments, submissions, and assessments are online. The learner is able to enter and exit the course at his or her discretion unless there is a specific need for a time limit for course completion. The learner will notify the instructor when the course has been completed. The learner led course operates much like a CD-ROM based course, except that it is able to track the learner's progress online and store data for each learner.

PERSONALIZED COURSES

Since students taking fully online courses are not likely to meet face to face with each other or the instructor during the semester, it is important for the instructor to provide alternative ways for such personal factors to influence the learning process. Several tools are available for the instructor to personalize or customize the course.

Home Pages

Many instructors provide a personal Home Page within the course content area and also encourage students to develop Home Pages as well. These pages might include a brief biographical sketch, e-mail address and even pictures of the students and instructor.

Threaded Discussions

Threaded discussions are quite popular with Web based courses. For each unit of study the instructor posts reading assignments, discussion questions, and recommends other resources for learners to review. Students interact online with the instructor and other students.

Chat Groups

Use of live chat groups is a popular method for interactive discussions and personalization of the online course. Chat groups can lead to threaded discussions of pertinent topics with the instructor as well as provide a means for student interaction with each other online.

E-Mail

Electronic mail is used frequently as a means for the instructor to communicate with the students, students with the instructor, and students with each other. E-mail, like the chat group, is especially useful for students working on small group projects. It allows the instructor to provide directions to and feedback from each group of students as well as with the entire class. Within the online course management tools, e-mail can be limited to just the students enrolled in a particular course. It is best not to integrate course e-mail with the university e-mail system.

LEARNING STRATEGIES

According to a recent Educause survey, "Technology enhanced teaching and learning is rapidly reaching critical mass." How will faculty be able to develop curriculum and teach in this new paradigm? "To be maximally effective in developing Web-based courses, faculty need, in general, to abandon the traditional individual approach and seek partners to carry out the project" (Chambers & Carter, 2000). There seems to be general agreement that although the individual faculty will develop the course content, expertise is required in several areas for the course to be highly successful. It is not likely that the faculty will be interested in spending the time necessary to become an expert in all the required areas. It is prudent that the team approach be applied to course development for maximum effectiveness and online course viability. By utilizing the experience of colleagues who have already developed Web-based courses and working with other recommended experts, the course development process is greatly enhanced. Expertise in the areas of innovative learning strategies such as interactive learning, cooperative learning, problem-based learning and mastery learning are extremely important in the course development process. Most institutions that currently deliver online Web-based courses recommend that the development team include: (1) a discipline specialist, also known as a subject matter expert or SME, for developing course content, (2) a pedagogy specialist, or instructional designer, who identifies the appropriate learning tools and develops the user interface, (3) an assessment specialist for mastery learning procedures, (4) a technology specialist or programmer for Web-based development and coding, (5) a graphic artist to produce market quality graphics and animation, and (6) a Web interface designer. Others also recommend the inclusion of a database administrator and a course editor. There is much recent literature to provide overviews of the various learning strategies and how they have been successfully adapted for Web-based courses.

HANDS-ON STUDENT EXPERIENCES

In courses requiring hands-on experiences, Web-based simulations are often used to meet this requirement. For some science courses that may not be plausible, in which case arrangements can be made for that portion of the course to be performed by students in a lab setting on campus or contractually with other appropriate organizations. For those courses which require students to perform tasks that produce a deliverable product such as computer output, those exercises can be performed in the computer lab and either delivered to the instructor via e-mail or via the homework drop box within the online course area. WebCT and other online course delivery tools provide this capability.

ASSESSMENT METHODS AND TOOLS

Online assessment most likely will be of a different nature from traditional classroom assessment methods. Authentic assessment for the purpose of enhancing learning is a must. Two popular methods of assessment are frequent mastery learning exams and student projects. Several software products are available to produce and deliver online assessment, some of which will integrate directly with WebCT. WebCT also contains a solid online assessment tool. We are currently testing Respondus Lite for test creation.

Mastery Learning Exams

Many current online course practitioners recommend utilizing a large number of test items by dividing course content into segments and developing test items for each segment. The idea is that frequent assessment tends to keep the student on track and current with the course material. Some book publishers permit faculty to use pre-developed test items for this purpose. Students take the tests online. The tests questions are usually generated randomly, and students can take the tests as many times as necessary to master the material. Through repetitive taking of the exam, the student should learn and retain the required information. Some schools even allow students to take the final exam multiple times without penalty. The nature and frequency of exams should be entirely at the discretion of the faculty and can be modified as desired.

Student Projects

Student projects can be performed either individually or within a group. Both methods work well with online courses. Many faculty prefer the group method because of the collaborative or cooperative learning that takes place. In either case, the faculty serves as a mentor to the students, and the students submit their completed products online in the form of reports to their colleagues and/or the instructor. A more detailed discussion of these assessment tools is provided by Carter & Lewis (1998).

TECHNICAL SUPPORT AND CONSULTATION

The Academic Computing Center has been assigned the primary role of support and consultation for the University regarding use of WebCT for course development and delivery and management. Our staff have all attended a two-day "Train the Trainer" WebCT workshop and have developed training materials that we use to train Mercer faculty. Two staff members, one of whom is currently serving as the WebCT Server Administrator, and the other of whom is a Software Training and Support Specialist, attended the annual WebCT 2000 Conference and will attend the WebCT2001 Conference. Our Software Support and Training Specialists have modified their software training schedule to allow them to incorporate WebCT 3.0 into the curriculum. We believe that by also utilizing faculty who are early adopters of WebCT, and by delivering timely training for faculty, we can provide adequate support for the early stages of online learning at Mercer. As other faculty adopt the new technology and begin to develop courses, we will definitely need to acquire additional staff. The team approach to course development is the norm and by all current research provides the most effective online courses.

SELECTION OF COURSE DEVELOPMENT AND DELIVERY TOOLS

Staff of Technical Services, Technology Support, and Academic Computing as well as some faculty had reviewed several of the popular online course development and delivery software tools. WebCT was selected as the tool of choice for Mercer, and it will be fully supported by our staff. Faculty may use other tools at their discretion, but we will not have expertise available for support.

POLICIES AND PROCEDURES

As we began planning strategies for our pilot project, we immediately recognized the need for some procedures to keep us from getting lost. We created an *Online Request for WebCT Course Creation* form for faculty to submit their requests for course shells. We also created a procedure by which faculty would be allowed to utilize WebCT for online courses. Both of these forms are available on the Academic Computing Web at http://www.mercer.edu/acadcomp under the WebCT drop down menu

SECURITY AND COPYRIGHT ISSUES

The University must deal with copyright issues related to online courses before the courses are developed. Web based courses can be valuable in the market place to other educational institutions as well as within the developing institution. Ownership of the course materials should be determined prior to development according to University policy. Security for individual course materials is made available through password protection. Initial passwords are issued to students who register for a class. There is concern within some institutions related to whether the enrolled student is the one who takes the online exams. Institutions have developed various methods for handling this issue. Use of proctored exams is one common method of assuring the enrolled student is the one who is actually taking the exam. Many institutions who are currently utilizing online exams do not consider this issue a major cause for concern.

OUR FIRST YEAR

We began a pilot WebCT project with 7 faculty and 14 courses in the fall of 2000. Emphasis was on the term *pilot*. The Academic Computing staff developed an outline of training for faculty and began developing the workshop content during the summer of 2000. The initial training outline consisted of a series of 6 modules.

Module 1 - Introduction to WebCT

In this module, the trainer uses a demo course that she has created to introduce the faculty to WebCT from the student perspective. Policies and procedures for requesting and maintaining courses are also discussed. This course is approximately 1 ½ hours in duration.

Module 2 - Getting Started with WebCT

This module is a hands-on workshop. Faculty learn how to access the WebCT login screen, create a syllabus, add entries to a calendar, create a welcome page, use the chat, e-mail, and threaded discussion features. This course is approximately 1 ½ hours in duration.

Module 3 - Create Course Content

In this module, the faculty learn to use the File Manager to load files to their course area, create single web pages of content, create content modules, create links, and backup course content to a local hard drive. This course is approximately 2 hours in duration.

Module 4 - Evaluation Tools

In this module, faculty learn to create questions and add them to a question bank, create quizzes and surveys, create self-tests, use the grades tool, and add student assignments. This course is approximately 3 hours in duration.

Module 5 - Advanced Tools

In this module, faculty learn to use the Whiteboard, create the Image Database, add the Glossary tool, Search tool, and Compile tool. This course is approximately 1 ½ -2 hours in duration.

Module 6 - Managing a WebCT Course

In this course, faculty learn how to use the Gradebook, Student Tracking, add teaching assistants, add shared designers, and reset the course at the end of a term. This course is approximately 1 ½-2 hours in duration.

ONLINE LEARNING AT MERCER FROM A STUDENT PERSPECTIVE

Sheila Newman, Academic Computing Specialist on Mercer's Atlanta campus, is also a student in the Technology Management MBA program at Mercer. She has taken several courses at Mercer that were delivered with WebCT. Sheila shares her experience and perspectives as a learner in two online WebCT courses.

Technology & Information Management

WebCT was introduced at the graduate level through the Master of Science in Technology Program with the "Technology & Information Management" course. Dr. Linda L. Brennan, Program Director, Master of Science in Technology Management, taught the course. The course is required for all technology management majors. TGM 600 was offered during the fall of 2000 for eight weekly sessions that run four hours and 15 minutes per session. Learner course work in this class traditionally consists of two assignments that require learners to read articles from Harvard Business School Press cases and respond to threaded discussions in WebCT.

Because of the pedagogical approach to active learning, the online chat feature was used for electronic interaction in three of the eight sessions. Online chat was especially beneficial to one of the learners residing in Columbia, South Carolina (about 200+ miles from Atlanta, Georgia) and other learners whose jobs required extensive traveling. These learners did not encounter any WebCT login problems during the course as they interacted in the online sessions. Learners were introduced to WebCT during the first class meeting. This introduction involved logging on and reviewing the course content. Learners were given their user names and were introduced to the Technology & Information Management WebCT site. As a representative from the Academic Computing Department, I administered handouts to the learners with illustrations and examples. The professor emphasized the use of a separate class Web site as a backup to WebCT throughout the course.

Given our pedagogical framework and focus, the professor selected two techniques to enrich the classroom experience and enhance the learning process. She selected threaded discussions as an asynchronous communication tool to increase course discussion and participation outside the confines of the traditional classroom. In addition to the discussions, the class was instructed to use the class list serve in posting various assigned articles. The four advantages of using threaded discussions were: place independence, time independence, structured communication and rich communication. Place independence suggests that learners can communicate thoughts and ideas from any Internet-connected computer. Learners were encouraged to use the university resources as well as home resources. Secondly, the learners have the convenience of working and contributing on their own time schedules; therefore, we were expanding the course time to anytime the learners were contributing to the threaded discussion. Threaded discussion technology provides a structure for many-to-many discussions. Using WebCT discussions, each learner message is recorded for all to review and respond accordingly. Given the asynchronous nature of the tool, learners can take time to reflect and respond; thereby increasing the richness of the communication.

WebCT's discussion tool was used to add an active learning element to the Technology and Information Management course structure. Learners attended weekly lectures and used the threaded discussions to interact with peers and the instructor outside the traditional class time. Failure to interact using his tool affected the learner's participation in the class, and this requirement was explained in the first session. Learners were encouraged to respond to the assigned topics as well as to other peer responses. Several assignments were done using the discussion tool with a hard copy turned in to the professor for grading. TGM 600 learners often used this tool for interaction. In fact, some learners started discussing other topics of interest in addition to the assigned topics.

Another tool used in this Technology and Information Management class was the synchronous chat tool feature in WebCT. Since the class size was approximately 25-28 learners, it was appropriate to use this tool throughout the course. In fact, the chat feature enabled the class to be conducted electronically on several occasions. On the first scheduled chat session, however, we experienced a problem with the server and had to resort to the class web site. The server had to be rebuilt and WebCT was unavailable for about a week. This chat feature presented some concerns since a few of the learners relied on computers used for work. In each situation, there were fire walls preventing them from participating in chat sessions. Since this problem does exist when there is a firewall, it is necessary that learners physically attend the class during these electronic sessions. Although electronic sessions were scheduled, the professor remained in the computer lab during the class hours scheduled for situations described above.

The professor used the mail feature to report individual learner progress. She sent these progress reports through WebCT to let learners know how well they were participating in the class. Other learners tended not to use this tool but relied mainly on their regular e-mail instead. The mail tool is confined to the WebCT course, so learners would have to be connected to the course in order to read messages. The professor had created other activities that consisted of a virtual lesson. This session was presented using PowerPoint and Word as she chose to download the guest speaker's notes. The professor included questions regarding the use of this online tool in the regular course evaluation form presented to learners at the completion of the courses. The learner responses indicated that WebCT did enhance the course.

Strategic Management in the Technology Intensive Firm

The professor utilized the same tools for the Technology Management capstone course as were used in the previous course. In addition, she added the grade tool so learners could check their individual progress. A course syllabus tool was used, and she has downloaded the syllabus used on her web page. A course schedule link was added to our TGM 698 page for learners to know when written assignments were due. For the electronic or virtual lessons, there were instructional overviews and interactive assignments for each lesson. This course was offered during Spring 2001 (March 10 – May 12). There were twelve learners enrolled in this capstone course. No formal introduction to WebCT was necessary, although the professor allotted class time for learners during the first session to explore the class WebCT site.

The professor used threaded discussions for some assignments. New WebCT users found the program easy to navigate, and interaction is better than it was in the first course offered in the TGM program. She also added some features in the course content such as a PowerPoint presentations and the Gradebook feature. Dr. Brennan added a self-test to this site for learners to test their understanding of the material presented in some of the online sessions. There was also a link on the home page for the learner to access the campus library because some of the assignments required extensive research. As the instructor facilitates the online chat session, learners are allowed to type (**) to make comment or (??) to raise a question. This first electronic session did present some problems because the professor was not able to access the Internet in the computer lab during the entire session. Learners attending the session outside Mercer's computer lab, however, did not encounter any problems using the chat feature. The professor was able to facilitate the chat for 35-40 minutes. Although it was impossible to access the Internet from the computer lab, learners attending the electronic sessions outside the lab were able to remain on the site and complete assignments that consisted of a virtual lecture, a self-test pertaining to that lecture and an assigned exercise. Learners also met in designated rooms in chat to discuss group assignments that were due the following week.

Prior to the next class meeting the professor posted a transcript of the electronic chat session for learners to read responses. At the next class session conducted on March 31, the professor questioned learners on the effectiveness of this chat session. Learners felt that the chat session was effective and thorough in covering the discussion of the book we were assigned to read and review. Learners expressed concern about not being able to respond fast enough due to limited typing speed. Learners also felt that the professor's response in recognizing learners in chat was overlooked. This problem was probably due to the loss of Internet connections. There was a suggestion that the professor post several questions either on the list serve or in WebCT's discussion tool for learners to review before the next chat session scheduled for April 7, 2001. Learners felt that discussion could be more effective if they were given the opportunity to have some responses already typed in a word processor that they could post in the chat feature more quickly.

Since the first WebCT graduate level course, Technical Support Services has worked diligently to solve the connection problems between the two campuses. Also, additional T1 lines were installed to making WebCT access more reliable. However, the firewall problem still exists, causing learners to have to get other access to the Internet when chat sessions are used. Academic Computing implemented a WebCT support system through which all WebCT users are informed daily on the status of WebCT at Mercer. Staff members are required to report problems encountered with WebCT to users and inform them when these problems have been resolved.

FAILURES AND SUCCESSES

Fortunately, our successes have outweighed our failures. There are, however, some failures that are significant.

Probably our most significant failure was not including more faculty in the initial review and study of course management tools and not including any faculty in the final software selection. That choice was deliberate on the part of higher management and has come back to haunt us several times. We had a couple of faculty who were already using another tool and didn't want to switch. They have been quite vocal about the lack of faculty input into the decision.

Our next most significant failure was not planning our hardware and network infrastructure well enough before beginning our pilot project. We had no idea of what we really needed in the way of server hardware, fault tolerance, redundancy, etc.. As our number of courses and student accounts grew, our server became inadequate. We initially installed WebCT on a Windows NT server, but the NT system was not stable enough. We then installed the Red Hat Linux operating system and had greater reliability. We also had insufficient bandwidth between campuses and network switches that were not working correctly to handle the WebCT course traffic.

Our third major failure was not staffing appropriately for this new venture. Mercer did not form a team that included the six specialist outlined above. As is often the case in education, we were directed to make do with current staff. We assigned WebCT responsibilities to staff who were already working close to maximum productivity. Mercer did not have a person designated as a server administrator. This task was handled by a myriad of people in the Technical Support Services department. Not having a Linux operating system administrator at the beginning caused some nightmares. About a third of the way through fall semester, 2000, our WebCT server was comprised by a hacker who had entered through a server at another college in a western state. That school was unaware that their server had been compromised until we notified them. Our WebCT server was off-line for 6 days before we had it wiped clean and completely rebuilt. We had no Plan B. Fortunately, we had adequate backup copies of all the course content. We then installed some security software we had not previously installed.

We have had some successes. We managed to complete fall semester with only the one major failure with the system. Our faculty training proceeded on schedule, and several faculty requested courses for spring 2001 semester. We began Spring 2001 with 14 faculty, 29 courses, and 525 students in WebCT courses. By mid-term, we had increased to 21 faculty, 41 courses, and approximately 745 students. By mid-term we had also trained 86 faculty or other designers from 30 different departments.

We also worked with the campus libraries to post electronic reserves to WebCT. We created a series of course shells that represent the various schools, colleges, and programs which utilize the e-reserves. All of our libraries can post electronic reserve documents to WebCT. Our coding scheme is such that only students within a discipline area have access to specific reserves.

Probably our greatest success is that both faculty and students are excited about the online course enhancements. The number of faculty enrolling in WebCT training and requesting course shells is growing as fast as our current staff can handle them. Faculty who previously posted course materials to their individual Web pages are moving their course content to WebCT because of its features and ease of use. We have received permission to hire additional staff in July to work with our WebCT online learning project. This position will be an Online Course Administrator who will work closely with faculty in establishing course functionality and reliability.

SUMMARY

Mercer University has embarked on an exciting academic and pedagogical journey with the adoption of WebCT as its development, management and delivery tool for Web based online courses. This innovative teaching and learning paradigm will place Mercer among other leading universities who have accepted the challenge of utilizing computer and information technology to its fullest extent to provide the best possible learning environment for our students now and in the future. Gilbert Paquette, of the LICEF Research Center, Tèlè Universitè, Montrèal, Canada, in his keynote address to the AACE ED-MEDIA 2000 World Conference on Educational Multimedia, Hypermedia & Telecommunications, coined the phrase, "Instructional Engineering," to describe this new form of course development and delivery. It is evident that we are entering a new era of instruction and learning both in the K-12 arena and in higher education. Mercer University is fortunate to have an administration that is forward thinking and willing to invest the necessary resources to engage our faculty, staff, and students in this innovative, technology-based learning experience.

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The software names, Embanet, WebCT, PowerPoint, Respondus Lite, Linux, and Word are copyrighted by their respective publishers.

Distance Education for Printing Employee Training: A Model for Certificate Based Education

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Introduction

Certificate programs are becoming increasingly popular as an alternative to formal education in the job market. Certificates like Webpage Development, Computer Network Systems, PC Technician and even certificate programs that get people ready for certification exams like A+, MOUS, MCSE, and Novell Networking are popping up everywhere. Many industries outside the Information Technology (IT) movement are developing certificate and certification programs for there specific disciplines. Some include construction, manufacturing, occupational safety, and fire service. There is currently a movement within the printing and graphic communications industry to develop certifications on not only software programs, but industry standards as well.

This presentation focuses on a recently developed one and two-year certificate education program for the printing industry at Georgia Southern University. The program, Printing Education Network (PEN), was conceptualized in Fall, 1998. The certificate program utilizes distance education and electronic technologies to deliver classes to the Southeastern printing industry employee population.

PURPOSE

The purpose of the certificate program is to provide a standardized, structured, certificate educational opportunity for targeted segments of printing industry employees. The Printing Education Network (PEN) is targeted to printing industry employees who:

- need print knowledge to enhance their current position,
- need print knowledge for either changing or retraining their positions within the industry,
- need additional print knowledge for transferring or enhancing their production area, or want to change from a production track to a professional career track within the industry

INDUSTRY NEEDS

PEN was developed after Georgia Southern University evaluated the current educational opportunities for printing employees and found:

- there is a labor need within the printing industry at all levels;
- the existing avenues of education and training is inadequate because of geographical location, economic restrictions, time constraints, and specific educational content;
- PEN will assist in furthering education for a labor force who is already in place within the

industry; finding qualified staff for available positions is one of the most difficult challenges facing printing companies and;

- certain supervisors may have technical skills because of on-the job experience, but may not have a global perspective of the industry, which is, according to the industry, a desirable characteristic of supervisors and managers.

Printing Labor Force Needs in the South

Nationally there are currently 35,000 - 50,000 available jobs at all levels in the printing industry. Georgia is ranked 15th nationally in the number of printing employees(Careers in Graphic Communication, PIA, 1996).

From a five state region perspective, Georgia ranks second in the number of printing industry employees (26,901 employees) when compared to the neighboring states of Florida (33,705), Tennessee(22,233), South Carolina (8,280), and Alabama (8,187). In numbers of companies, more than 1,155 printing related companies exist in Georgia and more than 4,201 companies in neighboring states(PIA 1998 Print Market Atlas).

The printing industry generally categorizes labor into two large segments, production and professional. Production workers generally include skilled and unskilled labor. Skilled labor generally consists of persons who have acquired their knowledge through experience and or training from high school, a technical school or a four year college. Unskilled labor includes persons who may enter the printing industry for a variety of positions. They typically have little or no understanding of the industry, and therefore must be trained from the outset of their employment (Careers, 1996). Professional positions in the printing industry generally include positions that require supervisory skills and/or people skills. These are usually people with both experience and a four-year degree or more.

A Printing Industries of America (PIA) market survey representing various printing industries reported that recruiting qualified staff for available positions is one of the most difficult challenges facing printing companies. Of the companies that were actively recruiting qualified personnel, 94.2 percent said they were having problems (PIA Print Ed Publication).

Educational Resources Available

When looking at post-secondary education for printing industry employees, two educational options currently exist. One option is to attend a two-year technical school or community college, which offers graphic arts education. The other option is to attend a four-year institution which offers graphic arts education. While these options have certain advantages for serving industry needs, few (if any) seem to provide a structured opportunity for industry employees to extend their supervision and management education while maintaining full employment. A typical example would be a valuable industry veteran who needs supervisory training in order to advance within the company he/she works.

One other education resource for employees is the typical workshop or seminar. The problem with seminars and workshops is that they typically vary in length, do not generally offer a standard of measurement for their participants, many times are "one time" courses with little opportunity for follow up, have limited time constraints and minimal faculty/student interaction. Industry seminars have been characterized by industry educators as "band aids" for many topics which need detailed attention.

DEVELOPMENT OF PEN

The first issue in developing any program of this type is to determine the target audience. The research was based upon educational studies of the availability of training for printing employees in the southeast. Surveys were also conducted through associations, corporate meetings, conferences and trade shows that focused on the training needs of the companies and the types of training needed. After compiling the data, it was determined that there was a need for training in all areas of printing, but especially for those employees that had hands-on skills, but lacked the theoretical or process knowledge needed to further enhance their positions. This data was developed into an initial proposal that we used to gain support from internal and external governing bodies.

After determining the target audience and developing our proposal, we developed an industry task force. The task force assisted in the development of curriculum framework, recommendations for faculty requirements, marketing, and funding resources. Initial task force input began in Summer, 1999 and has continued to be a contributing resource to the development of the program.

PHASE I: Program Framework

Before going public with the project, we felt the need to develop a basic structure for the program. With the help of the PEN task force, we formalized our initial proposal into a plan of action. The PEN action plan included a two-tiered certificate program. The PEN CORE is a one-year program designed to generate a foundation of terms and terminology for understanding the total printing industry. Courses included in the PEN CORE program are Basic Graphic Arts, Basic Desktop Publishing, Customer Service and Preflighting. The PEN CORE PLUS is a second year program for students that want to focus on specific topics and have completed the PEN CORE.

Courses are theory based with demonstrations and some include hands on training for an additional fee. Each course offered is 18 participant hours in length. Students receive CEU's for each course offered and must complete all assignments, quizzes and tests with a grade of 70% or above receive the final certificate. Since PEN is a certificate program, students have to be able to demonstrate their knowledge of the subject matter. By including tests and quizzes in the courses, PEN validates itself by providing employers with an indicator of the participant's success.

PEN's Unique Delivery Method

PEN uses state of the art electronic communication technologies to deliver instruction virtually door-to-door. Courses are taught using the most extensive live, real-time videoconferencing network in the world and online virtual classrooms. Using distance education, employees are able to attend industry training within a few miles of their facility.

PHASE II: Industry Partnerships

In developing the PEN program, it was apparent that we would need industry support. Financial backing was a factor, but by getting industry support we would gain credibility for the program and also have access to potential students for the program. Presentations were made to the Southeastern Prepress Association, the Association for Graphic Arts Trainers (Chicago), the Printing Management Advisory Board and the Georgia Distance Learning Association. From these contacts we were able to acquire start up funding, develop relationships with potential instructors, and increase our visibility with key companies that would be interested in developing partnerships.

Other Funding Resources

Industrial support was augmented by grant and university funding. Funding was received from a nationally competitive, industry funded research foundation grant which only awards approximately $300,000 per year. We received the maximum funding allowed in 1999 and 2000 which was in part by the innovative concept that PEN proposes.

PHASE III: Marketing and Visibility

Methods: Print Literature, live demonstrations, website

Initial Seed money funded a multitude of print media to promote the PEN program to industry. Media included flyers, personalized letters, brochures and invitations to special presentations. The PEN Showcase was a marketing tool used to educate the printing industry about the distance education arena, and provide them a free seminar to see the training in person. The Showcase included six remote sites in Georgia, three within 20 miles of three other states, and one site in North Carolina. This demonstration showed the versatility of providing one course at multiple sites, the quality of the instruction, the clarity of the technology, and the type of training that PEN offers. A website was also developed to advertise all the programs Georgia Southern offers in printing management continuing education.

ISSUES AND PROBLEMS WHEN DEVELOPING A DISTANCE LEARNING CERTIFICATE PROGRAM

Educating the Industry

Educated workers are always a need in the printing industry, but selling companies the concept of education is the first hurdle that is always a problem. In promoting PEN, not only was educating the employers about the importance of training a problem, but also educating them about distance learning capabilities is important.

Distance Education

Distance education, by definition, is based on the concept that the instructor and the student are not in the same room. Although this concept is not new, the delivery systems and the quality of the instruction has become increasingly better over the past ten years. Videoconferencing is the main technology used to deliver PEN courses and has been around for years, most people have never seen it used, or remember the days of jerky movements, poor sound, and head shots. Today, videoconferencing can include powerpoint slides, video, live interaction, quality imaging, white boards, and magnification of objects on the screen using the Elmo system. This, combined with online auxiliary education including interactive chat rooms for students, online discussion groups, supplemental readings, chapter quizzes, more accessible instructors and homework assignments, creates an environment that equals, if not exceeds the usual requirements of face-to-face instruction.

CONCLUSION

Even though PEN is a certificate program and not a certification program, the structure and course content is similar to typical degree programs which provide participants and employers a way of accessing the level of knowledge attainment of the individual taking the course.

PEN was initially developed to provide outreach education and with the potential for bringing income into the printing management program. All course fees have been developed to cover the direct costs associated with the classes, with any revenue generated being recycled into expanding the printing management outreach endeavors. Incorporating a specialized industry area, with a proven university environment, along with a validating certificate program and using distance education to cut time, economic, and geographic barriers made for a winning combination with the PEN program.

Multi-Tier Online Interventions: Forging Partnerships with a Virtual Business Training Center

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The Virtual Business Training Center – Virtual Workspaces

The Virtual Business Training Center (VBTC) is an integrated business resource center that provides business users with access to online training, market research, project management, and other project based resources. The VBTC also functions as a business lab and virtual internship for Ohio University students. Our interaction with business partners and student teams is maximized by both the synchronous and asynchronous benefits of our online approach. The synchronous and asynchronous work activities include online interviews, chat function brainstorming, real time desktop video conferencing spreadsheet work, and interactive web based posting of text, audio, and video clip outputs of data or analysis. The multi tier online site leverages the power of an interactive web based platform, desktop video conferencing, and compressed video to deliver a range of business services that emulates a corporate university for business users while offering a complete project based learning experience for students. Our work with the VBTC and business partners has been delivered on both Blackboard and Lotus Domino platforms.

Virtual Business Work Spaces are needed for Project Completion

There is a new and innovative performance development intervention that can dramatically impact the successful completion of project work by teams in either business classes or the competitive workplace. Using several tiers of online technologies will prove to be a significant means to improve the performance of project teams. Many business classes use a project and team approach to delivering important business information. Some entire business curriculums are based on this approach. Most dynamic business activities are handled on a project basis with many in a team format. Both environments work hard at improving the success of their project management activities and need stronger interventions that will increase the outcome performance.

The project based approach functions as a "pull" system, much like successful and innovative production control systems that require parts to be delivered only as they are needed using a Just in Time (JIT) system. The successful integration of business skills and software expertise can emulate the shop floor control model. The issue is Push vs. Pull. Pulling the business content requirement and technical skills into the project/classroom at exactly the time business learners need those enablers optimizes the benefits of experiential learning project work. It also increases the range of applications of various business skills. As an example, the pull method of integrating software into a business class is driven by the actual business project. The question of what type of enabler (skill intervention) is needed is matched with what best enables the successful completion of the project component. The project also is the significant criteria for what should be introduced (knowledge intervention) as preparation. Using the software example, the project will determine whether the project team will get exposure and training in software for spread sheets, project management, statistical analysis, statistical process control, flow charting, desk top publishing, activity based costing, or simulation software. The timing of the required training intervention is determined by the immediate needs of the project team in resolving project problems. The introduction, demonstration, and hands on project application are only presented when the team is ready to apply the software application for project activities.

A comprehensive project-based program will require the understanding and usage of relevant knowledge and expertise. The real time nature of projects should eliminate the expended time lag between the receipt of theoretical information and its implementation in solving problems. A project-based approach can focus on skills, knowledge, and attitudes. This approach requires dynamic responses from learners exhibiting some skills and gaining exposure to others (Hoyt 2000).

An innovative use of online technologies is not just an alternative to be used in project- based business training it is a better platform. Project managers, trainers, and faculty can use a web-based platform to maximize their facilitation of the project. An online platform in a learning setting will:

1. Increase participation of learners
2. Provide more opportunities for critical thinking
3. Enhance communication between team members
4. Enhance communication between business sponsor, facilitator, and team
5. Increase probability of achieving required deliverables
6. Quicken responses and facilitator interventions
7. Complete project closer to planned timeline schedule
8. Increase communication between team members
9. Provide clearer exhibition to business skills and knowledge
10. Establish more cohesive group work
11. Complete project completion closer to planned specifications
12. Facilitate earlier interaction with facilitator
13. Facilitate earlier interaction with business sponsor
14. Provide opportunities for increased number of outside experts involved with project

The use of an online platform also has additional benefits in a workplace setting by providing an organization with several optimal efficiency outcomes including:

1. Optimize employee's time on project
2. Reduce costs
3. Maximize outcome performance
4. Provide stronger support to keep project on timeline
5. More effective project status reporting,
6. Effective interaction with internal or external sponsors
7. Tracking of project progress is more efficient

8. Maximize team member expertise
9. Allow team members from different locations to have full participation
10. Improve the efficiency of other work activities and project work (Hoyt & Stockman 1999).

How the Virtual Business Training Center Works

Business projects, in fact all projects, have common success determinants and common barriers. A project team's effectiveness is always measured by their ability to reach stated goals, speed – throughput rate of project completion, stamina – the ability to finish projects and then move to the next project, and the contribution of the output to the organization. Dean and Evans describe quality problem solving teams with similar effectiveness criteria and recognize that the consequences of poorly run projects or ineffective teams can have a dramatic impact on an organization's competitive advantage (Dean & Evans 1994).

Accepted guidelines for project success is measured by three primary criteria: Achievement of Specifications, Time Schedule adherence, and Cost controls such as hours, $, etc.. Achieving specifications includes reaching the project objectives and purpose from the customer/sponsor's perspective. Is the final outcome or deliverable the same as the target? Does the final outcome/deliverable provide the intended benefits? Adherence to the time schedule is defined by meeting the intended finish target date or key milestone dates. Cost control includes the evaluation of meeting the targets of projected allocation of resources including people, supplies, expenses, materials, etc. (Kerzner 1998). Some experts target communication issues, coordination of activities, and skill levels of team members as the key opportunities for project teams to improve goal attainment, project completion, and schedule variances (Dean and Evans 1994).

My (Hoyt's) hands on experience with workplace problem solving teams, project teams, and student teams the past 20 years has convinced me that the most significant reasons teams are less effective than they can be or need to be has to do with two key factors, access and interaction interventions. Work teams that exhibit poor performance always exhibit poor communication, coordination, and skill gaps but some successful teams also exhibit those traits some time during the project experience. Our most recent applications with online facilitation that maximizes access and interaction has convinced us that we have a better approach and means to improve project work in both education and the workplace. The combination of team effectiveness criteria and project effectiveness criteria is the arena or environment where technology as an intervention can provide the necessary advantage that facilitates and maximizes team and project success. Technology is not the answer, access and interaction is the answer. Specific online technologies maximize the facilitation of access and interaction for teams and projects. All of the effectiveness criteria and team dynamics can be dealt with by opening up more opportunities and better options for interaction and access within the project's life. All project participants (education and business) can move within the project information using this platform without restrictions of meeting times, other work activities, or travel. Using this new platform there is an increase of communication, participation, and work input of sponsors, experts, and team members.

Access components

1. Information
   - Schedule
   - Work in Progress
   - Problems, questions, issues
2. Expertise
   - Technical (project management, design, market research, etc.)
   - Business software applications (spreadsheets, desk top publishing, scheduling, statistical analysis, etc.)
   - Strategy (customers, consultants, Trade Associations, etc.)
   - Training (Continuous Improvement, software, project management, etc.)
3. Sponsors
   - Customers
   - Suppliers
   - Internal (Executives, Corporate, Functional Managers, Faculty, Project Managers, etc.)

Interaction components

1. Synchronous (project status, work activities, strategy interventions, etc.) – discussing, meeting, and working together at the same time. All of these activities can be done with some or all of the team members at remote locations.

2. Asynchronous (work in progress, general communication & coordination of activities)- discussing, meeting, and working at separate times on the same information. All of these activities can be done with some or all of the team members at remoter locations.

3. JIT – Just in Time interventions. When so much information is available so quickly on team activities, progress, and data the opportunity to intervene with timely expertise increases. When a work team is approaching a pivotal problem solving sequence (data analysis and evaluation) the facilitator (faculty or project manager) can arrange software or statistical analysis interventions. A facilitator can "see" the team's up to date and continuous progress and post a video clip, outline, and analysis template on their discussion board using the teams actual data. Project team members can access the video clip file/mini lecture, review the outline alone and then as team online, and get started with template (Excel spreadsheet, SPSS statistical software, or Statistical Process Control software) to move project forward with out any unnecessary delays.

4. Tool selection – A wider and fuller use of deliveries is available for interaction using online platforms and electronic communication tools. This is in comparison to narrow and restrictive classroom lecture or conference room meeting environments. The following section on technology platforms describes key components and usage of several electronic communication tools. The descriptions demonstrate the breadth and depth of various tools that better link theory and skills, provide more options for differing learning and working styles, maximizes a collaborative learning and performing environment, and builds strong novice – expert relationships.

Technology platforms that support Access and Interaction

1. Compressed video – This is a synchronous approach that requires all participants to have access to compressed video equipment. The most effective use is to provide larger amounts of verbal information, obtain immediate feedback and consensus, and facilitate group exercises. Kick off meetings or initial project prioritizing is typical online usage.

2. Desk top Video Conferencing – This is a synchronous approach that facilitates actual work activities online. Although this component has real time audio and video its primary purpose is to support sharing and collaborating data and analysis with business software. This Internet access platform can be used one on one or with multi cast server software as many as ten working at a time. The desktop camera and microphone allows for smooth communication as team members share spreadsheets, statistical software, project management software, etc. The most significant benefits include expanding work capacity of work team, efficient movement of team through project completion, effective use of Just in Time interventions, greater reach to remote team members, travel costs can be reduced, accesses best balance of team skills and knowledge, and facilitates effective meeting management (Hoyt and Stockman 1999).

3. Interactive web based database
   - Discussion boards – This is primarily an asynchronous approach that allows an array of postings. These postings are done on an interactive web based platform such as Lotus' Domino Server Software (Lotus Notes) with interaction done at any time. Access is facilitated through WWW to a Web site that has linked databases for discussion. Formatting of the discussion boards can be constructed by setting up categories of each main summary category of the project as a heading with messages, status reports, etc. being posted to the appropriate project category. Category headings posted for an system improvement project would be Defining the System, Baseline for system, Cause Analysis, Improvement implementation, study the improvement change, standardize improvement, and plan for continuous improvement. As the student or work team moves through these problem solving phases each team member can post their work (or work in progress) onto the discussion board and immediately it can be accessed by viewing the information and the interaction can begin on that component (questions by customer, responses by team members, interventions by experts, etc.). This work can be done and posted at any time and interaction can take place at any time, there is not a delay waiting for the next meeting or formal reporting process. More interaction takes place and greater access to project activities improves effectiveness of the work.
   - Text files – text can be posted directly onto the message board or attached to a message (similar to e-mail attachments). Project team members can post outlines, interviews, spreadsheet data, analysis graphics, and project schedules. There is not another platform available that can put so much project information in a common location for all project participants to access. A full view of the entire work allocation and project status is available from remote locations and has piggybacking opportunities as more info shared earlier has greater response participation as feedback.

- Video and audio files – These video clips can be posted and then viewed using Real Player plug in. The clips can be used to facilitate the introduction of new project phases, announce a message to all project team participants, and provide needed reference material for team progress. Individual team members can view video clip at convenient time, post responses or questions, discuss the information together online (in chat room), and begin application. Perhaps a video clip is posted by facilitator that reviews the strategy and logistics of constructing an important customer survey. Certain team members may have more responsibility or sole responsibility for this component of the project and would use the clip has a "how to" intervention. The other team members should view the clip now knowing the requirements and better prepared to offer support. A video clip can be maximized by providing an outline (as text posting), referencing Internet links, or establishing a template that can be filled out as individuals view the clip. Simple PowerPoint files narrated can add significant value to the stratification of data.
- Chat functions – this synchronous format in private chat rooms maximizes communication with team members of three or more. This supplemental electronic communication tool provides a forum for live discussion of activities, project status, debriefing of individual interventions with facilitators, issues and barriers. This easy access electronic communication tool can be used to facilitate intra team communication and communication between team members and facilitators. Interactions are logged and can be posted to discussion boards for reference by all team members. Logs can be used for team members that miss chats, or for those team members that were not part of a specific intervention between facilitator and team members. The dynamics are unique for problem solving and require similar level of keyboarding skills to move quickly through a discussion. A chat facilitator is recommended for each work session to keep on task. This tool is excellent for updating task status (in round robin fashion) and generating a volume of ideas from remote team members.

Unique Advantages of the Virtual Business Training Center

Our multi tiered online platform (compressed video, desk top video conferencing, interactive web site) expands the contact opportunities of remote team activities. No team is in constant proximity or communication yet coordination, collaboration, and communication must take place for successful completion of a project. This innovative platform and approach positions team members and their work at immediate access and facilitates more sharing of information. It encourages greater participation and enables technical expertise to intervene earlier and more often. These improved access and interaction levels maximize the resources available for effective task completion and overall project success.

After many independent online business projects we designed a framework that will house ongoing online project activities for both student and business usage. Our platform will serve as a "corporate university" incubator site for small and medium size firms and provide virtual training experiences for students. Research, training course development and delivery are just a few of the offerings to companies with limited funds or online training expertise.

New Knowledge Opportunities for Business and Education

A key online business relationship exists when an organization, facilitator, and learner interact within a technology platform to develop workplace performance. These technology tools can help learners (both students and employees) target and reach their highest performance objectives quickly and with reduced trainer support. In project based classes or modules there are exciting opportunities for problem solving to be facilitated by advanced and interactive technology interventions. As technology advances there is a new requirement to discover the levels of interaction and the impact of multi media web based technology on project based college courses and training modules. New knowledge can be gained by exploring unique applications of technology platforms that facilitate project deliveries. Our own preliminary results indicate an increase in interaction and access (participation) of data usage, analysis of data, and facilitation work by nearly three-fold compared to traditional face-to-face project environments. Our study also reflects that the number of interactions between team members and the facilitator increased on average from 22 contacts per team to 48 contacts per team in the web-based environment. Contact with each individual learner increased from 50% to 100%. Quality gains have also been observed including an increase of at least 32% of required deliverable components completed. Total project completion to schedule increased from 0% on time project completion in traditional project delivery to 80% project completion using the web-based environment. A developmental assessment effort can be used to study existing online web-based intervention platforms and their effectiveness in facilitating a project-based delivery.

New Knowledge is where many training facilitators and university faculty must pause and consider their actions. Are the online interventions being used effective? Do the online interventions improve performance areas targeted? Are the online interventions more effective for the majority of the learners? Can learning using online interventions be measured? Can application of learning be measured? Other questions can and should be addressed as innovative online technology tools continue to be introduced and requirements for employee performance development increases. The burden at this point is obviously shifting from what can be done using online technology platforms to which ones work and where are they best applied. Unfortunately this is a forgotten task of trainers and faculty, we plan and do and then plan and do again without gaining key knowledge of the effectiveness of our techniques or tools. Assessment represents the set of activities that moves from doing (implementing a new online component such as video conferencing) to studying the doing action and determining whether the intervention actually made an improvement in learning or application. If we have quantitative and qualitative based knowledge in a particular online intervention that did or did not improve learning or application then we have new knowledge – assessment's ultimate goal.

New Knowledge Framework

The process for effective gain of this new knowledge includes the following 4 steps:

1. Planning an online intervention – This step is not an arbitrary action guided by what technology is available or most innovative but rather a structured and focused plan. After initial defining activities selection of a subsystem to improve takes place, the improvement effort exposes identifiable skills or knowledge gaps, and then a baseline needs to be taken. What level of skills do learners possess right now? What is the level of performance

exhibited currently? What is the level of satisfaction that customers of this subsystem express? What is the current training intervention used to improve these areas (classroom deliveries, CBT, etc)? This balanced measure baseline will provide data that can be used later to determine whether a new and innovative online technology training intervention has actually made an improvement in skill and knowledge application and whether that improvement has had an impact on exhibited performance, customer satisfaction, and competitive position. The gap between the existing performance and desired performance is the next piece of the plan to be examined. These planning activities include identification of all the interferences between the existing performance and the desired performance. Finding the most significant interference prepares us for the next stage of a new knowledge quest.

2. Implementing an online intervention –Immediately after planning the training focus area that requires performance improvement selection of an appropriate online intervention is considered. The elimination of the significant interference becomes the criteria for selection of which online intervention will be best to try. At this point a match of needs, expertise and availability of technology can be maximized. A small intervention change should always be attempted first before major investments are taken and because we do not yet have knowledge of the effectiveness of the technology intervention.

3. Assessing the technology intervention – Quantitative and qualitative examination of the intervention as it compares to the baseline. The design, collection, analysis, and evaluation of the data results will determine whether the online technology training intervention had the desired impact, did it work?

4. Standardize the use of the online intervention – this step may also include the abandonment of technology interventions that do not make improvements in learning and application. Increasing retention of information that does not increase student/employee performance is not improvement and should not be used to determine technology intervention effectiveness. If an online technology intervention has been documented to improve a training output (learning and application) then the improved training intervention should be standardized. The new technology intervention should be implemented on a larger scale than the pilot. It can be used to deliver other knowledge or skills area needs (i.e. sales to software instruction) or used for all learners in a particular skill area.

Research Parameters

***Research Project Description*:** This applied research project will focus on examining solutions to practical problems experienced in project based classroom deliveries. This Type I Developmental Research will emphasize the study of a specific online technology platform and its use and will produce a research output that articulates lessons learned from analyzing this online technology platform in use to facilitate business projects in the workplace and college environments.

1. Research and evaluation questions
    a. Primary research questions
        - Can online platform improve access (increased volume – quantitative) to resources (information, data, team members, etc.)?

- Can online platform improve interaction (increased effectiveness – qualitative) with and among resources (team members, facilitator, sponsors, data analysis, etc.)?
- Can improved access and interaction through online platform improve project management success?

b. Secondary research questions

- Are learners more satisfied with use of online technology to facilitate team project activities?
- Are learners more satisfied with the results of online technology toward project completion?
- Are learners more satisfied with online technology as a learning environment?
- Are facilitators more satisfied with learner participation and demonstrated expertise?

Assessment/Research Hypothesis: Can a high end and interactive online training environment enhance access and interaction of team member activities and improve project completion…or…

Project Statement: To improve the high end interactive online training environment as measured by frequency of access and interaction and successful project completion.

Operational Definitions for Project Statement/Hypothesis

- High-end interactive online platform – web based platform that includes interactive web site, desktop video conferencing, and compressed video technologies. This technology platform has both synchronous and asynchronous applications.
- Training environment – both virtual and traditional classroom
- Access
  1. Information – schedule, work in progress, problems, questions
  2. Expertise – technical, analysis, project management
  3. Software applications – spreadsheets, scheduling, statistical analysis, etc.
  4. Planning – with sponsors, team, facilitator
- Interaction
  1. Synchronous – real time discussions, presentation of information or data, planning activities, consensus or decision making sessions, work sessions analyzing or stratifying data, and project status reporting. These work team activities can all be accomplished from remote locations. Technology tools include chat function, email messenger service, desktop video conferencing, and compressed video.
  2. Asynchronous – separate time activities that include discussions, presentation of information or data, planning activities, consensus or decision making sessions, work sessions analyzing or stratifying data, and project status reporting. These work team activities can all be accomplished from remote locations. Technology tools include interactive web site discussion board where files are posted and retrieved (text based files, video clip files, audio files, graphic files, and other business software files).
  3. Just in Time interventions – the opportunity and execution of interventions with timely and needed expertise. Facilitators can arrange skill based or knowledge based interventions as they observe online team activities.

- Successful project completion – conformance to meeting approved project deliverables and adherence to approved project schedule.
  1. Deliverables – meeting agreed upon outcomes at agreed upon quality levels that become the specifications of any project
     a. Software outputs
     b. Decision milestones
     c. Project status reports for team, facilitator, and sponsor
     d. Project specific milestones
  2. Schedule
     a. Project progress tracking
     b. Upstream intervention
     c. Maximize activity sequencing
     d. Maximize resource allocation

The Virtual Business Training Center addresses key training issues in the forging of strong relationships between education and business. Our review examined the gaps in traditional delivery vs. online and web-based training deliveries. We examined the new partnerships that virtual workspaces facilitate for students and business organizations and we presented a viable training and learning delivery model using a virtual project based and online environment. The crux of our model is based on positioning our delivery environment in the most flexible arrangement so we can absorb the dynamic nature of content, delivery and performance needs of learners and their organizations.

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Developing and Deploying Intelligent Agents in Education

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Abstract

Intelligent agents are rapidly becoming a way to leverage scarce academic resources to assist students. Agents today can search for information, inform and notify about key events, manage information, even provide information. Indeed, we are close to having real-time learner relationship management (LRM) agents suitable for providing a credible assistant faculty member.

Within the last few years the development and deployment of intelligent agents has become easier and cheaper. Although still an emerging technology, intelligent agents have already reached to point where they can be used to provide a means to enhance learning, whether in the classroom or via distance education. Several low-cost, easy-to-use packages have emerged, with useful features, such as anthropomorphic features and speech recognition. Soon, LRM agents will be providing useful information in many classrooms and over the web. This presentation will discuss several key developments in the intelligent agent CRM/LRM area. Several intelligent agents will assist in the presentation of material and will be demonstrated.

Introduction and Background

One of the most interesting, and potentially important, aspects of the information technology revolution might be the rapid integration of intelligent agent tutors into the classroom environment. "Intelligent software agents", also known as "knowbots" or just "bots" have recently become more than just a better way to find, filter and fuse information, especially from the internet. More and more agent technology is progressing to a point where the use of agents is becoming a main way in which to adjust to "information overload". By using intelligent agent technology, users are able to have multiple "assistants" available to provide them with the means to providing key information in a timely manner. Agent technology is the key to changing the metaphor of the internet from "self-service" to "room service". The difference in the metaphor is critical to dealing with the vast information base growing daily.

Intelligent agents (a.k.a. software agents and/or knowbots) are, in simplest terms, software programs built to autonomously perform certain specific tasks for the user. Intelligent Agents combine some elements of Artificial Intelligence (e.g., expert systems, object-oriented technology, neural networks, genetic algorithms, fuzzy logic, case-based reasoning, speech recognition, natural language processing, etc.) into an interface that has great applicability and appeal. Behind the agent front end is more often than not some simple rule-based programming which triggers actions when certain conditions are met. Newer agents are even beginning to evidence a crude capability to adjust their "reasoning" and "learn" from the user.

Today

Today, one growing and important use of intelligent agents is providing customer relationship management (CRM) or, in the case of educational institutions, learner relationship management (LRM). Already, agents are beginning to provide the same (better?) level of support for customers that has heretofore been provided by humans. Agents, for example, can:

1. **Answer questions** Often there is a relatively small set of questions which gets asked repeatedly. Anticipating these questions, agents can be scripted to provide accurate and timely answers. Instructors with experience teaching courses are easily able to provide the answers to these common questions and thereby reduce the burden of answering common questions.
2. **Provide navigation assistance** Especially in a distance education course, there are often questions about navigating a web page or finding the correct link to key information. Again, agents or "bots" can very readily provide this assistance.
3. **Generate email responses** Another useful function of an LRM agent is to generate an automatic email response. Today, many email packages support autoresponders, but these autoresponders are often simple "Out of the office messages". Soon, agents will be able to analyze email generated by students and respond appropriately with valuable answers, not simple administrative replies.
4. **Advise on products and offerings** Agents are quite capable of assisting in the selling aspects of products, be the products commercial or educational (courses or programs). By having a permanent sales agent available, visitors can get the information they need, whether it is a phone number or advice about applying to a program or information about a product.
5. **Instruct and sympathize** Agents can even assist in the instruction and support mode. With streaming video and audio, agents can provide instructional support almost at the level of an undergraduate teaching assistant in many aspects.Furthermore, agents are now beginning to provide students with just-in-time learning, customized for what they need at the moment they need it. These agent "instructors" can substitute for limited human instructors and, although not nearly as capable (yet!), can often answer a significant number of anticipated queries.

The advantages of using such a technology are numerous. Intelligent agents, for example, do not skip steps in helping customers, but show near infinite patience in answering the same or similar queries over and over. Agents do not (unless scripted to do so) have tempers or short fuses, so they can present a pleasant personna at all times. Further agents can be inexpensive to deploy, especially when compared to the cost of providing similar human assistance. Properly utilized, agents can be a formidable adjunct to a live education provider. Finally, an overlooked advantage is that of "dialogue mining". Agents record all conversations, so later these conversational logs can be examined and, if questions are being asked frequently which the agent has no answer for, these answers can be added to the knowledge base of the agent. In this manner, the agent "learns" or at least becomes smarter.

Future

The future is even brighter for the use of intelligent software tutors. Soon, however, it may be possible to have a personal tutor for each student. Running over the web, this intelligent agent tutor will be customized to not only provide the instruction that the student seeks at the time he or she seeks it, but will do so in a very effective manner. Several low cost, easy-to-use packages have begun to emerge, with useful features, such as impressive anthropomorphic features and speech recognition. Indeed, they could soon even become mentors for faculty as well as tutors for students. Already, inexpensive graphical interfaces exist which would allow a professor to put his or her own 3D face on the agent, thereby adding to the comfort level of the student.

As the use of the web increases and the concept of anytime, anywhere just-in-time learning becomes more popular, the use of intelligent agents to provide some instructional support will grow. As the technology rapidly matures, the limiting factor will no longer be the technology itself, but the development of a new paradigm for teaching. Instead of "one size fits all" lectures, for example, lectures will be customized for each student and provide information at a pace appropriate for each student. This mass customization feature has been taking place in other areas, but, so far, has been limited in education. Intelligent Agents will provide the means to have a personal tutor or instructor tailored for each student. Instead of having to rely on one instructor, students will have the ability to tap the information reservoir through their intelligent agents who can link to virtually all information. Instead of having to wait for feedback on an exam or private counseling session, students will instantly know what they have done right and wrong. Instead of having to meet at a particular time and place, students will be able to meet anywhere, anytime with their personal agent tutor and still enjoy the richness of a face-to-face session.

Additionally, there will be an increased development in the capability of the software agents to provide support. Soon, agents might be able to learn for themselves rather than being constantly reprogrammed with new information. Agents might, for example, be able to search the web for answers to questions that they cannot answer currently and, automatically, add these answers to their knowledge base. Increasing ability to "learn" from experiences, increased improvements in anthropomorphic features, increased friendliness, increased ability to collaborate and increased ease-of-use will no doubt boost the use of intelligent classroom agents.

A WEB-Based Testing System for Introductory Mathematics Courses II

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Abstract:

At the June 2000 ASCUE Conference, the author discussed and demonstrated a web-based testing system that was developed to support Personalized System of Instruction (PSI) in developmental mathematics courses. The system was used in an experimental section of Math050 - Pre Algebra Mathematics during the Fall 2000 term at Monmouth University. This paper will briefly discuss the results of that experience. However, the main focus of the paper will be on providing instructions on installing and administering the system. A demonstration on the setup procedures will be conducted. At the conclusion of the presentation, appropriate functional software will be distributed to interested parties (at no charge).

Instructional Setting:

Monmouth University is a private, comprehensive, teaching university enrolling approximately 4500 students of which 3200 are full-time undergraduate students. The University is located in the central shore area of New Jersey – about 55 miles south of New York City.

The Mathematics Department has eleven full-time faculty members. The Mathematics Majors program at the University enrolls over 60 full-time equivalent students; a significant number of those students are dual-majors – mathematics and education. As with most institutions of today, a substantial part of the teaching responsibility of the Mathematics Department is directed toward instruction for non-majors with many in the non-science disciplines. The largest single group serviced by the Department consists of those students majoring in programs within the School of Business Administration.

Like many (most) higher educations institutions of today, the University boasts of a wired campus. At Monmouth, this includes connections to all campus buildings and to each room in the residence halls. At the present time, the University is completing a plan to wire all classrooms with video and data and to install computer-supported video display units that are connected to the campus network. There are currently 27 computer laboratory/classrooms and 25 classrooms with permanently installed video display units.

Brief Description of MUTester

As reported in both [4] and [5], the author developed a comprehensive web-based system to provide students with a baseline of problems that can be used as individual practice problems or as a basis for testing. Students are able to access the problem sets from any web-connected station, whether it is on campus or off campus. By working through the problems, students are able to evaluate their own readiness for tests and quizzes. The original system was expanded to include a testing component. The complete system, including the practice component and the testing component, is called *MUTester*.

An on-line demonstration of the testing component was presented at the June 2000 ASCUE Conference. At the time, the author indicated that plans were in place to use the system to support an experimental section of Math050, a remedial course in College Algebra, during the Fall 2000 term. That section was offered in the *Personalized System of Instruction* (PSI) mode of instruction. A full report of that experience is contained in [5].

As reported in [4], the basic design goals of MUTester were:

1. Provide for web accessibility through Internet Explorer or Netscape 4.0 or higher browsers.
2. Support dynamic additions and deletions to the test set database.
3. Support a variety of modes at the problem presentation level.
4. Provide access to individual student progress records.
5. Support dynamic test creation from a problem set that can be assigned to a given student or to an entire class.
6. Provide an authorization mechanism for test administration.
7. Support faculty level administration.

Brief Summary of Student Progress and Outcomes -- Fall 2000:

Twenty-three students, mostly first time freshman, enrolled in the course. After elaborating on the goals and the format of the course, all but one student elected to remain in the course section. Of the twenty-two students who remained in the course, eighteen successfully completed the course by passing all the unit quizzes. Of the four students who did not complete the course, three were first time freshman and one was a continuing freshman.

Three students in the class completed all 12 units by the end of the seventh week of class. The following table lists the number of students completing the units by week. Eleven of the students completed the units during the final week of class.

Course Completion by Week

Week	7	8	9	10	11	12	13	14
Completing	3			1	1	1	1	11

Of the four students who did not complete the course, one did not successfully complete any of the unit tests, two completed nine of the twelve, and one completed ten of the twelve.

Sixteen (16) of the eighteen (18) who completed the course filled out a student evaluation report. All sixteen (16) students indicated that they had a successful experience in the course section and fourteen (14) indicated they would recommend the format and experience to others. Nine (9) of the sixteen (16) students indicated that they felt they were properly placed in a remedial math course. The others provided a variety of reasons why they were not properly placed in the course.

Description of the System:

The MUTester system consists of two database files and a directory structure on a web server that contains the html forms and ancillary files. One database, the problem set database, organizes and controls access to the various problem sets while the other one, the testing database, controls the testing process and maintains student records. The system runs under IIS 5.0 and uses "Active Server Page" (ASP) technology to access the databases and files and to format the pages for presentation to the browser.

Since the June 2000 demonstration, the system has been completely redesigned. The system now "seamlessly" supports access to both Access tables and SQL2000 tables. The upgrade was a result of the successful pilot project wherein 22 students were supported in the Fall 2000 pilot project. The average number of students using the testing component at any give time was about 5. That number was well within the capability of Access. With plans to move toward supporting 60 to 70 students, it was recognized that the Desktop database, Access, was not the appropriate platform to support the project. Consequently, the system was redesigned to support both Access and SQL2000 database files -- in any combination.

Unless specified otherwise, the system assumes the default settings of Access as the database server, Problemset.mdb as the problem database and MUTester.mdb as the testing database. As described in more detail below, alternate servers and databases are set using the option
"server=yourservername:yourdatabasename."

System Component Descriptions:

Except for any of the databases that are located in a SQL2000 server database, all files and directories are contained within a single directory structure with root name "MUTester." That directory structure should be located on a web-server running IIS4.0 or higher. The system will function using one of the Microsoft Personal Web Servers, however that severly limits the number of connected users. The requisite directory structure is:

MUTester
- ***/Administration***
- ***/DatabaseMaintenance***
- ***/Databases***
- ***/Images***
- ***/Include***
- ***/Practice***
- ***/Problems***
- ***/Testing***

The ***Administration*** directory contains all the html files and code necessary to maintain the testing databases. The basic features supported by the items in this directory are:

1. Add a course section
2. Add students
3. View and add/delete to course roster
4. Exam Header Maintenance
5. Individual Student Exam Maintenance
6. Class Exam Maintenance
7. Progress Report by Class
8. Individual Student Progress Report

Access to these features is through the html form: "adminmenu.asp." The complete URL to maintain the default testing database would be:
"yourwebservername/MUTester/Administration/adminmenu.asp"

To maintain a different database it would take the form:
"yourwebservername/MUTester/Administration/
adminmenu.asp?server=yourservername:yourdatabasename".
Appendix A contains a screen shot of this menu.

The ***DatabaseMaintenance*** directory contains all the files and code necessary to maintain the problem set databases. The basic features supported by the items in this directory are:

1. Select a server and problem set database
2. Add, Edit and Delete information regarding a specific problem
3. Add, Edit and Delete information regarding problem classification
4. View existing classification information

Access to these features is through the html form: "dbmaintenance.asp." The complete URL for the form is:
"yourwebservername/MUTester/DataBaseMaintenance/dbmaintenance.asp"

The form presents dropdown boxes for selecting the various options. The Appendix B contains screen shot of this menu.

The ***Databases*** directory contains all the Access databases for the system. For the system to function in the Access default mode, this directory most contain the two databases: Problemset.mdb and MUTester.mdb. The installation set contains these two databases, a template database for each of these structures, and a sample database containing some sample data for each.

In addition to the web-based tools contained in the DatabaseMaintenance directory described above, these Access databases can be maintained directly using Access, provided there is network access to the web-directory containing the MUTester materials.

The ***Images*** directory is a repository for any images that may be used. It is not necessary that images files be placed in this directory. However, it is a location that can be easily identified. For example, this is an appropriate place to store the university logo that could be used as part of the page design. The next directory contains a generic header file that can be edited to individualize page headers.

The ***Include*** directory contains five critical files. These files are required for proper functioning of the system. They are:

1. Blank.htm
2. connect.inc
3. error.asp
4. includeheader.asp
5. MUTester.ini

The *Blank.htm* form is called by a variety of the programs to initialize parts of a frame-set page. Nothing has to be done to the file.

The *error.asp* file is used to report some run-time errors that occur during the execution of the system. Attempts have been made to build in some error traps. A typical error that is reported through this mechanism is an attempt to link to a nonexistent server or database.

The *connect.inc* file establishes connection to the various databases. It uses DNS-less connections. The file is included in all pages that require access to a database. It functions as a subroutine where it is passed server and database information in the form: servername:databasename. Here is where the default settings are set if a null-string is passed. This file does not require any editing.

The *includeheader.asp* file contains the information that is displayed on the top part of any page presented in frame-set format. This file can be edited to match individual site setting.

The last file in this directory, *MUTester.ini* is a text file that contains the server database information required for the dropdown boxes in the database management section. The file contains a description of the requisite format. It should be edited when servers and databases are to be used other than the default ones.

Problem set Database Description:

The database for a problem set contains three tables. A small table keeps a count of the number of times the initial screen is downloaded to a client browser. That count estimates the number of times users access the system. The second table contains information on the various problem classifications for that database application. It has a field that identifies the classification by name, a field for instructions for that type of problem, and a field for a sample problem. The sample problem is optional. It is a variable length field and can contain the complete text (including html format statements) or a link to external file that will present the sample file. The instructions field is of variable length and provides instructions to the user as to the goal of a specific set of problems.

The main table coordinates the necessary information for each problem. The table contains a link to the classification table that identifies the problem type. It contains a field for the problem, five fields for possible multiple choice answers, five fields for comments on each of the possible answers, and a field indicating which answer is the correct answer. The five comment fields are variable length text fields and can contain html formatting statements. The problem field and the five answer fields can contain text with html formatting statements (they are fixed length fields 75 characters), links to a gif file, or links to a external text file. These external text files can be any type of html document including embedded links to gif files or other files. The default is text. A link to a gif file is denoted by placing the "!" in the first position in the field followed by the relative URL for the gif file. A link to an external file is denoted by placing the "&" in the first position of the field followed by the relative URL for the text file. The relative URL for these files assume the root directory "*MUTester/Problems.*" They can be placed in the *Problems* directory or any subdirectory thereof.

Requirements for Creating Additional Databases:

Template databases exist for the problem set database and the testing database. The default databases, problemset.mdb and mutester.mdb are part of the initial installation. The template databases can be used to set up additional applications. Just copy the template databases and rename them as desired. If the new database is a problem set database, then information must be added to the MUTester.ini file contained in the include directory.

Resources Required for On-going System Administration:

In general, the system does not require extensive system administration beyond the initial setup. Not counting the problem database maintenance and the test administration and reporting, there are few system administrative tasks. Basically, system administration consists of:

1. The initial set up of the system -- This requires creating the MUTester directory on a web server and placing the application files and subdirectories in that directory.

2. Setting appropriate security parameters on the web-server -- In general those security issues are: read/execute permissions to the standard *iusr_servername* internet user account to the *MUTester* directory and all subdirectories. In addition, the *Databases* subdirectory must grant full control to the *iuser_servername* account. That setting is required for an Access database to operate in a multiuser mode. Access creates and deletes lock files in a multiuser environment.

3. Upsizing to SQL2000 server -- If the application is going to use files in an SQL2000 database, the appropriate databases will have to be imported into SQL. Normally this procedure will require the assistance of a system administrator. With the administrative tools described above, the requisite assistance will be only in upsizing to SQL, not with any maintenance issues.

4. Adding gif and text files to Problem directory -- The text and gif files that support the problems reside in the Problem directory. Normally, they are organized according to problem classification. These supporting files must be stored in the Problem directory on the web-server. Some procedures will have to be developed with the web-server administrator for the addition and deletion of items in the *Problem* directory. With the existence of local area network, this could be accomplished by a share name being assigned to the directory and a drive map set up on the computer of the user responsible for maintaining the problem set databases.

Future:

Currently work in underway to develop a mechanism to support free formatted answers. That is, support for other than basic multiple choice questions.

In addition, thought will be given to the transition to some of the emerging technologies that will support the presentation of mathematical content on the web. It has been slow in coming, but maybe in the near future, we will have a broader support base for MathML. One that will support the development of content as well as one that will support browser rendering with a minimum of user effort.

Requisite Skills:

Other than the administrative tasks described above, the only technical skills needed to develop material for the system is the ability to create text files with some simple text editor (as simple as notepad) for the word problems; and the ability to create the gif files for complex mathematical expressions that cannot be placed directly in text or html code. MathType or the simple equation editor in Word would be adequate to produce simple mathematical expressions. The other part of the process is to complete the appropriate web-form.

Reference:

1. Fred S. Keller, *Goodbye Teacher*, Journal of Applied Behavior Analysis, 1968, 79-89.

2. James Kulik, Chen-Lin Kulik, and Kevin Carmichael, *The Keller Plan in Science Teaching*, Center for Research on Learning in Teaching, University of Michigan.

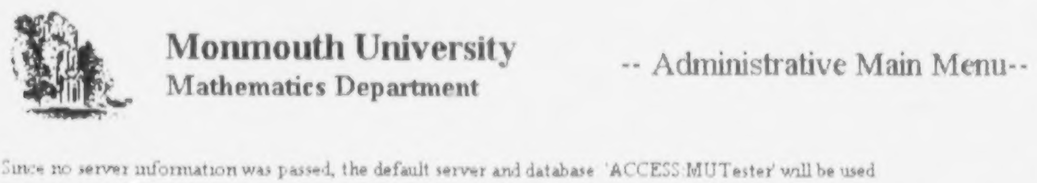
3. Richard Kuntz, *A Web-Based System to Support Practice Problems in the Classroom*, 12th International Conference. on Technology in Collegiate Mathematics (ICTCM), 1999

4. _____, *A WEB-Based Testing System for Introductory Mathematics Courses*, 33nd Annual Conference Association of Small Computer Users in Education (ASCUE), 2000.

5. _____,*Using a Web-Based Testing System to Support PSI in Remedial Mathematics*, Joint Mathematics Meetings, 2001

Attachments:

Screen 1 -- Testing DataBase Management Menu



Monmouth University
Mathematics Department

-- Administrative Main Menu--

Since no server information was passed, the default server and database 'ACCESS:MUTester' will be used

These are the available administrative programs for the Monmouth Univeristy Mathematics Testing System -- MUTester

Add a Course Section -- This screen adds a course section to the schedule

Add Students -- This screen adds new students to the database

View and add/delete class roster -- This screen maintains the class roster. It adds and deletes students from a class roster.

Exam Header Maintenance-- This screen maintains the available exams for each course section.

Individual Student Exam Header Maintenance -- This screen maintains individual student exam header information (adds or deletes header records) regarding examinations. Students are not able to take examinations unless an exam header recorded has been created. This feature can be used as a check on taking examinations in a random order.

Add Student Exam Header by Class-- This screen creates an Exam Header for all students is a specific class

Select Course for Progress Report-- This screen selects the course for printing progress report

Student Progress Report -- Prints student progress report by individual student selection

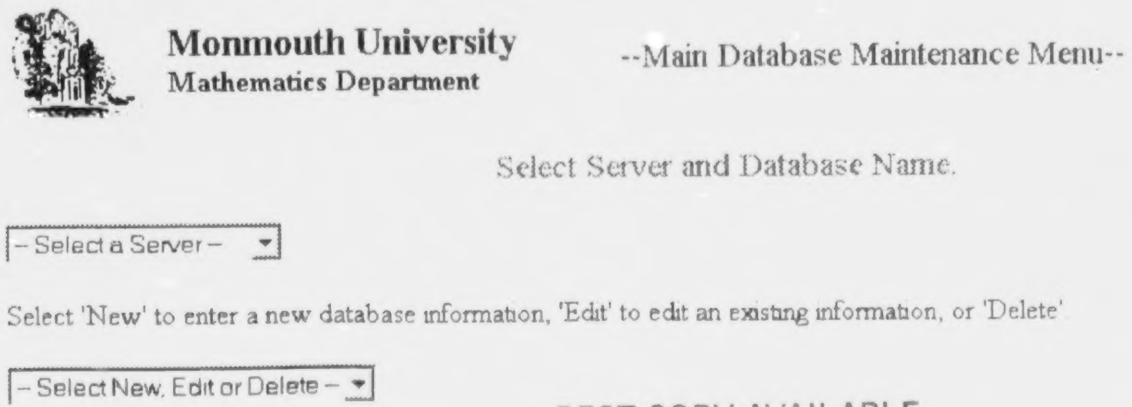
Miscellaneous

In the Testing subdirectory of MUTester, there is a program that can be made available so that students can view the progress of the entire class. It can be placed on the same web page that students use to access the testing component. The URL for the page is:

" MUTester/Testing/StudentViewGradebook.asp?idx=*courseindexnumber*"

The *courseindexnumber* must be replaced by the value in the "idx" column in the table "tblCourseHeader" in the testing database corresponding to the course.

Screen 2 -- Problem set DataBase Management Menu



Monmouth University
Mathematics Department

--Main Database Maintenance Menu--

Select Server and Database Name.

– Select a Server –

Select 'New' to enter a new database information, 'Edit' to edit an existing information, or 'Delete'.

– Select New, Edit or Delete –

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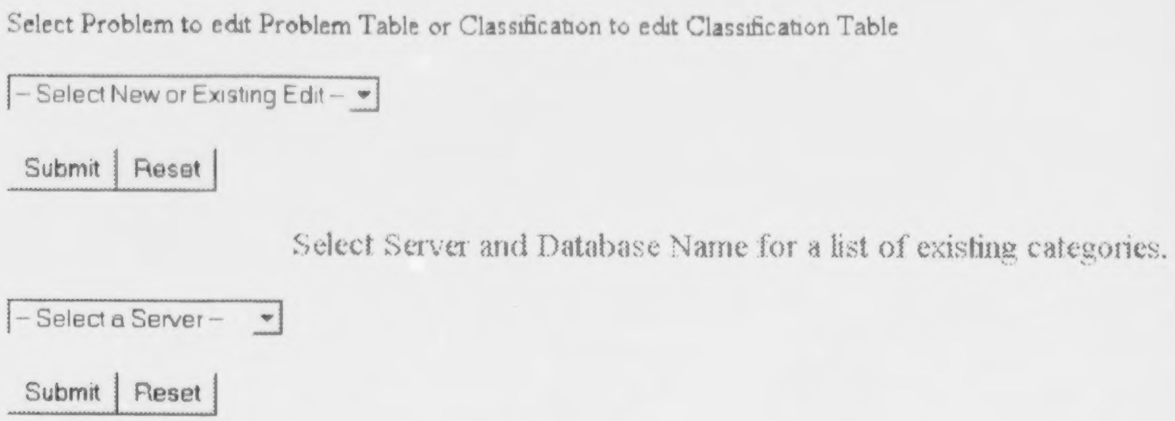

Select Problem to edit Problem Table or Classification to edit Classification Table

Select Server and Database Name for a list of existing categories.

Screen 3 -- IncludeHeader.asp

```
<TABLE BORDER=0 CELLSPACING=0 CELLPADDING=0>

<col align="left" width="90" valign="top">
<col align="left" width="200">
<col align="left" width="50">
<col align="left" >
<tr>
<td>
<img src="..\images\yourlogohere.gif" align="left" border=0 alt="">
</td>
<td>
<span style="font-size:16pt; font-weight:bold">
Your Institution Name Here</span>
<br>
<span style="font-size:12pt; font-weight:bold;">
More on you name if needed
</span>
</td>
<td></td>
<td>

<%=Session("Header") %>

</td>
<td>
</td>
</tr>
</table>
</pre>
```

Using Microsoft Terminal Server to Support Mathematics Courses

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Abstract:

This paper discusses some of the issues involved in setting up and administering the Microsoft Terminal Server to support the mathematics curriculum at Monmouth University.

The Windows2000 Terminal Services provides terminal support to the Windows2000 Server. Terminal Services is a multisession environment that provides remote computers access to resources on the server. The specific feature that will be discussed is the Terminal Services Advance Client. It is a Microsoft ActiveX Control that is added to Internet Explorer to provide Terminal Services over the Web.

The author will describe the setup procedures and basic security settings that will permit students to access the resources in the mathematics laboratory at Monmouth University.

A demonstration will be provided to illustrate how the services will be implemented for the Fall 2001 term.

Instructional Setting:

Monmouth University is a private, comprehensive, teaching university enrolling approximately 4500 students of which 3200 are full-time undergraduate students. The University is located in the central shore area of New Jersey – about 55 miles south of New York City.

The Mathematics Department has eleven full-time faculty members. The Mathematics Majors program at the University enrolls over 60 full-time equivalent students; a significant number of those students are dual-majors – mathematics and education. As with most institutions of today, a substantial part of the teaching responsibility of the Mathematics Department is directed toward instruction for non-majors with many in the non-science disciplines. The largest single group serviced by the Department consists of those students majoring in programs within the School of Business Administration.

Like many (most) higher educations institutions of today, the University boasts of a wired campus. At Monmouth, this includes connections to all campus buildings and to each room in the residence halls. At the present time, the University is completing a plan to wire all classrooms with video and data and to install computer-supported video display units that are connected to the campus network.

There are currently 27 computer laboratory/classrooms and 25 classrooms with permanently installed video display units.

The Mathematics Department has a computer laboratory with 30 computers, a laboratory classroom with 15 computers and a video projection system, and access to two other classrooms with video projection systems. All computers in the Mathematics Department are pentium 266 or higher units running either WindowsNT 4.0 or Windows2000 operating system. The main software products used by the department are: MS Office Productivity Suite, Maple 6.02, MiniTab, Geometer's SketchPad, InteractiveDE, Advanced Grapher, and Euphoria.

Project Objective:

In 1996, the Mathematics Department adopted a three-year strategic plan to increase the use of technology in the course offerings: Technology Infusion Objective. The salient features of the objective were:

- Increase the use of computer laboratory exercises.
- Increase the use of computer laboratory assignments.
- Provide access to a repertoire of Video Tapes.
- Provide Web-based Course Study Guides.
- Provide Web-based Class Notes.
- Provide Web-based Are You Ready? - Practice Tests.
- Increase the use of Class wide "question-answer" discussion groups (collaborative technologies).

The department has made substantial progress in achieving the aforementioned goals. Early in the fall 2000 term, the department began to revise and update the goals and objectives. At that time, it was agreed that the next step in the technology infusion component was to provide a means for students to access the resources that have been made available in the mathematics laboratory environment. Those resources include: application software, in particular Maple, sample files and worksheets, and template worksheets for homework assignments. As a result of those discussions, a pilot project was conducted to install the Microsoft Terminal Services software on an existing computer and provide local terminal access. By the start of the spring 2001 term, the experimental server was in place and available for limited local use. It was restricted to intranet use only. Students were able to access the server from any University workstation on campus and from their personal computers in the residence hall, provided they subscribed the the campus network service.

Since the initial installation was a pilot project, the service was not widely advertised. A small section, a laptop section of Math118 - Quantitative Analysis II for Business Students, met in a "lab top" configured classroom. Students in that section were granted access to the server. As a result, the students were able to access the mathematics laboratory resources from their classroom desks. The instructor was able to have students access the materials without having to disrupt the flow of the class by moving to the computer laboratory. In addition, the author advertised the availability of the feature to students in his class. It is not known how many students took advantage of the service. However speculation is that very few did since there were no explicit requirements. It was intended just as an optional resource for them during the spring pilot period.

Terminal Services Main Features:

The Terminal Services application within the Windows2000 Server environment provides remote access to a Windows2000 desktop through a "thin-client" model. The Terminal Services application running on the server transmits only the user interface to the client computer. The client computer transmits only keyboard and mouse clicks back to be process on the server. The application programs execute on the server. Each client session is managed transparently by the server operating system.

Terminal Services communicates with client computers in either of two ways: full local client installation or through an ActiveX control within Internet Explorer.

The full client software can be installed on a variety of computer hardware platforms. The communication between Terminal Services server and the client computer takes place over a local area network using any of the Windows2000 supported networking protocols. In addition, communications can be effected through web-based technologies using Internet Explorer 4.0 or higher. In the latter case, it is called the *Terminal Services Advanced Client* (TSAC).

Terminal Services Advanced Client is implemented through a Microsoft ActiveX control that is invoked from within a web document. The ActiveX control is designed to deliver essentially the same functionality as the full client software that is installed on the client computer.

The Terminal Services application running on the server has the significant advantage of providing to the user a consistent user interface to a controlled environment. One that is ideally suited for academic applications, where the goal is to have students run a specific application, and where the application may be required to access a specific dataset. Students need not have the application installed on their own computers. The advantage of TSAC is that the requisite ActiveX control can be downloaded and installed on a client computer without any direct interaction with the user. There is no setup program with parameters to be set and decisions to be made. The ActiveX control is downloaded to a client computer only once. From that time forward, a web page initiating the TSAC executes transparently.

In addition to functioning as an application server, the Terminal Services application can function as an administrative tool to administer other Windows2000 computers in a local domain. However, it cannot function both as an application server and as a administration server.

Computer Hardware Support Terminal Services:

In February 2001, the Mathematics Department acquired a new server to support the project. It was a Dell-Power Edge 2450, Pentium III 1GHz Server. The main configuration components are: 640 MB of ECC memory and 2 18 GB SCII Drives

The recommended configuration guidelines for a Terminal Services application are:

1. Approximately 20-40 MB of RAM for a typical client session. A "power user" might require 40MB or more of RAM.
2. A Pentium II running at 400 MHz can support 15 to 20 typical users. With "power users," the number could easily be one-half of that.

3. Network bandwidth requires 2 to 6 Kps for a typical user during a communication cycle. Applications involving a high level of graphics will require more network bandwidth during the communication cycle.
4. Since Terminal Services is part of Windows2000 Server core software, no substantial disk space is required. Disk space on the server depends entirely upon a local policy on user disk allocation.

Terminal Services Setup Procedures:

It is recommended that Terminal Services be installed on a member server in a Domain and not on a Domain Controller. Setting up Terminal Services is straightforward. It can be done at the time of the installation of the server software or at a later date. Best practices indicate the latter procedure. The server configuration wizard contained in the Administration Tools folder in the Setting - Control Panel folder is easy. There is basically one question: the question on whether the application should be configured as an application server or as an administrative server.

As described above, when using the TSAC option, client software setup is transparent to both the user and the system administrator. Installation of the software on the server and the client machine is not the difficult part.

The major parts that require a level of Windows2000 Server expertise are:

1. Setting up user logons and security.
2. Installing the TSAC application software on the server.
3. Designing the html documents that support the TSAC application.
4. Installing the application software that will be accessed through the Terminal Services environment.

User Logons and Security:

There is a collection of four tabs in the Active Directory Users Properties menu that relate to Terminal Server Users. Most of the default settings appear to be satisfactory. The key selection is under the Terminal Services Profile tab. There is a check box to grant permission to logon to a Terminal Server. It appears if that check box is set, then the user can attempt to logon to any terminal server for which the user has been granted permission.

Two other tabs that contain some options worth considering. The Environment Tab has a selection for specifying what program the user executes at logon. The Sessions Tab has selections specifying actions to be taken relative to connect times. When to disconnect; maximum length of a connected session.

Installing TSAC:

The ActiveX control for the TSAC is installed through the program "Tswebsetup.exe" which is found on the Microsoft Windows 2000 Service Pack 1 CD or through a download from the Microsoft site. Just do a search on TSAC. Running the executable on the target Terminal Server will install the necessary files in the default directory C:\Inetpub\Wwwroot\Tsweb. The author experienced a little difficulty when moving some, but not all, of the files to a different directory. A word to the wise is to keep all the files installed through the setup program together in the same directory. From the author's experience, the mstscax.cab (My guess it means "microsoft terminal server client active x") file must be in the same directory as the web pages that invokes the ActiveX control object.

The Microsoft terminal server download web package contains two other setup programs: Tsmmcsetup.exe and Tsmsisetup.exe. These setup programs install some management tool snap-ins for the Microsoft Management Console. Even though not necessary, it is probably best to run all three setup programs.

Designing html Pages:

The Tswebsetup.exe program installs three sample web pages. One is the default document for the directory. The other two are sample "asp" documents that actually perform the connection via the ActiveX control within IE. These sample pages form a basis for the connection and can be edited to match a University's motif. At the present time, we are working on an enhanced introduction with instructions and help files to assist students in the process of logging on to the service and to provide a mechanism for selecting among the applications that will become available.

Installing Applications:

All applications to be supported by Terminal Services should be installed after the Services have been setup. Terminal Services must be made aware that an application will be running in a multi-user mode. Also, there is another trick in setting up an application. Terminal Services runs in "user mode" and "install mode." All applications must be installed when Terminal Services is operating in install mode. The best way is ensure this is to install all programs through the Microsoft Add/Remove programs option in Control Panel. This procedure automatically places Terminal Services in install mode. If an application attempts to start its own install outside of the Add/Remove Programs menu, it is recommended that the install be aborted and restarted through the menu.

It goes without saying, there is no guarantee that a specific application can function in a multi-user environment under Terminal Services. Even Microsoft had to develop some patches to have their office programs operate under Terminal Services. Instructions on the patch are available at the Microsoft site.

Initial Implementation:

Since our goal is to extend the resources beyond the mathematics laboratory, we will be using only the Web-based TSAC application and not the network based full client.

The initial implementation of TSAC will be to support the algebra system, Maple. From our experience, most, if not all, mathematics majors will obtain a copy of Maple within the first couple of semesters at Monmouth. The goal is to enhance student experience in the technical courses for non-mathematics majors. It is unrealistic to expect students in those courses to acquire a copy of

Maple. Having it available to them, provided they have access to a computer, will enhance their experiences in the courses.

The first course that will immediately benefit from the implementation will be Math 117-118, a two course sequence in quantitative analysis in business processes. A substantial amount of computer laboratory work has already been incorporated into the sequence. The presence of the server will extend the resources to an anywhere anytime availability.

Problems and Unanswered Questions:

One of the major inconveniences of the TSAC application over the full client implementation is the concept of client computer drive mappings. The full client creates drive mappings to the client computer drives. This permits easy transferring of files to and from the Terminal Services application. In particular, students would be able to save partially completed work on their own private hard drive, then at a later time restart a Terminal Session and pick up where they left off. TSAC does not permit local drive mapping. The author has not found any indication that the feature will be incorporated in TSAC in the near future.

TSAC does support local printing. The default printer on the client machine is accessible to a TSAC user. Consequently, even though students won't be able to save their work to their own local hard drive, they will be able to print out the result.

Some of the literature claim that TSAC supports clipboard redirection. This feature would permit copying and pasting between an application running on the Terminal Server and an application running locally on the client computer. However, the author has been unable to get that feature working properly. More study needs to be done on that advertised feature.

All in all, TSAC appears to be able to meet the objectives stated at the beginning of this paper.

Future:

Depending on the outcome of the fall 2001 experience, Terminal Services applications will be expanded to include other software. In particular, there are some simple graphing packages that would be of great utility in the basic level mathematics course if they were readily available and presented a consistent and easy to use interface. The Mathematics Department provides substantial service in basic statistics courses. In our Mathematics Laboratory, some of the sections have laboratory experiences using MiniTab. This would be another candidate for a Terminal Services application.

Developing and Maintaining an On-Line Catalog as a Cohesive, Integral Part of Your .edu Web Site

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Overview

Most educational institutions include a course catalog as part of their Web site, albeit as more of an afterthought or add-on rather than as a key focus of their Web strategy. The relatively low effort put into the development and maintenance of an on-line catalog is in contradiction to the critical role the printed catalog publication plays at most colleges and universities. While an on-line catalog does not eliminate the need for a printed counterpart, a good on-line catalog is nonetheless a wonderful and indispensable tool for students, academic advisors, faculty and staff. Creating a useful on-line catalog does not need to be technically complicated or time consuming and can be done in partnership with students and faculty. This paper demonstrates how this can be done successfully and uses as a model the development of an on-line catalog for Weber State University in Ogden, UT.

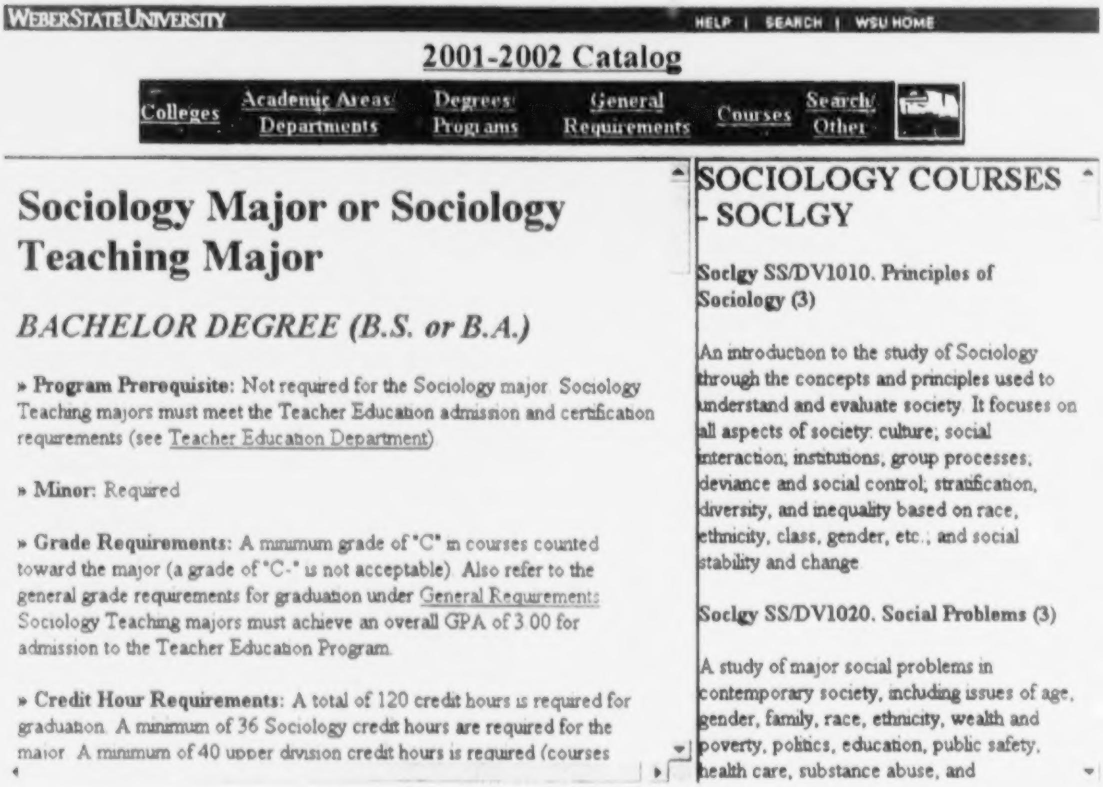
History

The on-line catalog at WSU evolved through trial and error. Like many educational institutions across the country, WSU at first opted for using PDF files to provide catalog information on the Web. This proved to be cumbersome for those trying the access the catalog information, especially when attempting to download the PDF files over a slow connection. After numerous complaints, a catalog committee undertook the task of identifying the key aspects students, academic advisors and faculty wanted in an on-line catalog. The committee, along with the help of students in a technical editing class at WSU, spent six months reviewing on-line catalogs at other colleges and universities and talking to students, faculty and staff to gain a good understanding of what was desired in an on-line catalog. The overwhelming message was that an on-line catalog should be a clean, not "glitzy," straightforward HTML format that is hyperlinked, segmented so that each section downloads quickly, and organized so that the user never loses their place or has to back out of a long trail of followed hyperlinks.

Based on the results of the catalog committee study, WSU developed a successful on-line catalog that is popular with both current and prospective students, academic advisors and faculty. Some of the feedback about the on-line catalog includes: "Your system is very user friendly, thanks." "I like the way the catalog is organized. We use it here in the Academic Advising Center, and it's wonderful to navigate–very easy for students, and that's a big plus." "I am very impressed with the layout of the catalog and the user-friendly links to helpful information. I am a student at another university and their web site doesn't compare to how helpful and informative yours is." "Thank you for not clogging up valuable space with pretty pictures which are of little value when trying to get facts."

Design

Sample Screen Capture from WSU On-Line Catalog



2001-2002 Catalog

Sociology Major or Sociology Teaching Major

BACHELOR DEGREE (B.S. or B.A.)

» **Program Prerequisite:** Not required for the Sociology major. Sociology Teaching majors must meet the Teacher Education admission and certification requirements (see Teacher Education Department)

» **Minor:** Required

» **Grade Requirements:** A minimum grade of "C" in courses counted toward the major (a grade of "C-" is not acceptable). Also refer to the general grade requirements for graduation under General Requirements. Sociology Teaching majors must achieve an overall GPA of 3.00 for admission to the Teacher Education Program.

» **Credit Hour Requirements:** A total of 120 credit hours is required for graduation. A minimum of 36 Sociology credit hours are required for the major. A minimum of 40 upper division credit hours is required (courses

SOCIOLOGY COURSES - SOCLGY

Soclgy SS/DV1010. Principles of Sociology (3)

An introduction to the study of Sociology through the concepts and principles used to understand and evaluate society. It focuses on all aspects of society: culture; social interaction; institutions, group processes; deviance and social control; stratification, diversity, and inequality based on race, ethnicity, class, gender, etc.; and social stability and change.

Soclgy SS/DV1020. Social Problems (3)

A study of major social problems in contemporary society, including issues of age, gender, family, race, ethnicity, wealth and poverty, politics, education, public safety, health care, substance abuse, and

The solution to a segmented, hyperlinked, organized and straightforward HTML format is to use a frames format, which is easily accomplished by using a program such as FrontPage. While, in many instances, the use of frames is not favorable, for an on-line catalog it works! In particular, the use of frames allows a menu bar to be kept in place at the top, thus providing easy navigation through the catalog in addition to a quick link to a feedback form and to the home page. In addition, the use of frames allows for displaying program/major requirements in one frame while also displaying the course descriptions in another frame. That way, when a particular course is listed as a requirement for the major, the course description for that course can also be easily referenced.

This sample shows key elements of the basic catalog design and the frames page layout. This frames page consists of three frames. The frame on the top is consistent on each page in the catalog:

1. A bar at the top to identify Weber State University and give links to the WSU Home Page and to the WSU Web site help and search features.
2. The catalog year is identified (with a hyperlink back to the catalog home page).
3. A menu bar allows users to access course requirements in a number of ways:
    a. By college – Each college page contains general information about the college along with links to departments/areas and degrees offered within the college and also a link to the college's home page.

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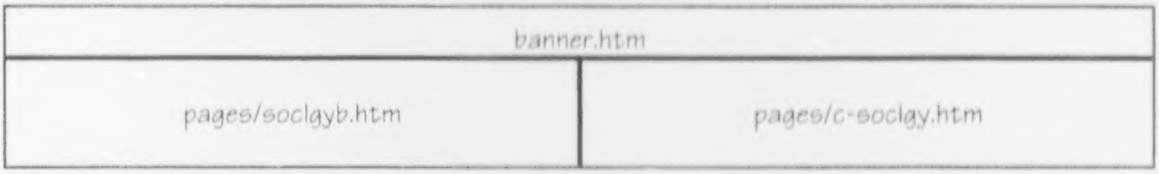
b. By academic area/department – Each department page contains general information about the department along with links to the requirements for degrees and programs offered under that department and also a link to the department's home page.

c. By degree/program – Each degree/program is linked to a page that displays the requirements for the degree/program along with the descriptions for courses within the program.

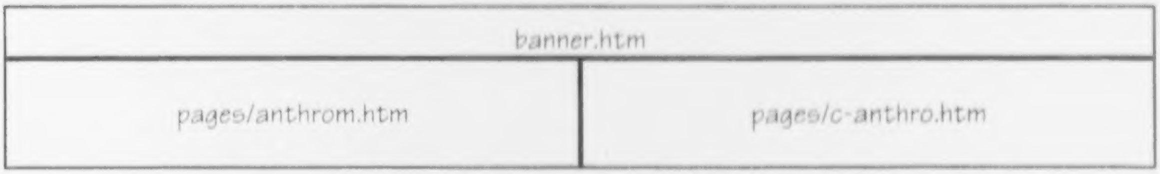
d. By general requirements – This includes the core and general education requirements for all degrees.

In addition, the menu bar contains a link to all the course descriptions that also gives access to the on-line schedule of courses. The Search/Other option on the menu bar allows a user to search the catalog for a word or phrase and also provides links to information about admission, registration, student services, etc. Finally, on the far right of the menu bar is a link to a form for asking questions or providing feedback.

The key to the successful implementation of the frames format is to create separate frames pages for each academic department, each degree, etc. That way the hyperlinks are replacing the entire page and not just an individual frame and it is less confusing for the user. Each frames page is named with a tilde (~) and all the individual pages that make up the frames page are kept in a separate directory. The naming scheme corresponds with the course abbreviations. For example, the frames page for the sample on the previous page for the sociology bachelor degree is named ~soclgyb.htm (soclgy is the abbreviation for sociology courses and the b stands for bachelor degree). The pages contained within the frames are:



Likewise, the frames page for the anthropology minor is named ~anthrom.htm and consists of:



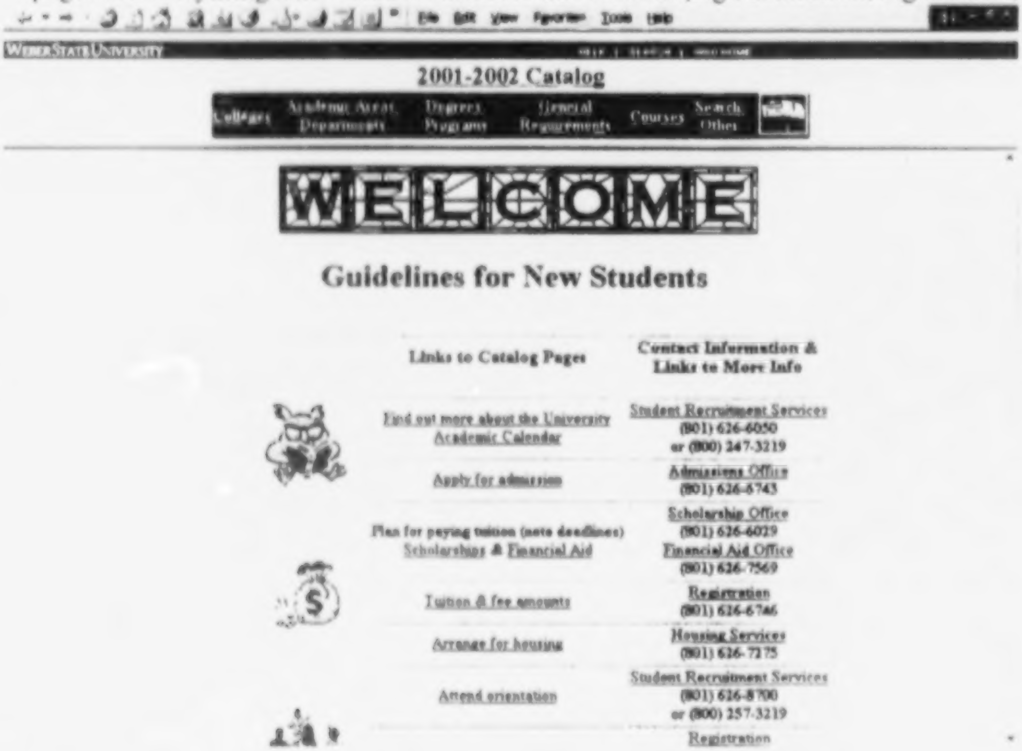
All links within the catalog to the sociology bachelor degree go to ~soclgy.htm and all links to the anthropology minor go to ~anthrom.htm. When program changes occur, the pages that are edited are pages/soclgyb.htm and pages/anthrom.htm. When course changes occur, the pages that are edited are pages/c-soclgy.htm and pages/c-anthro.htm. This organization makes it easy to maintain the catalog and is seamless to anyone viewing the catalog on the Web.

To initially convert the catalog text into HTML and save it into separate files, WSU hired three students and gave them instructions that stepped them through the process. They were able to complete the conversion within one month. By using FrontPage, because it is relatively easy to hyperlinks. None of these students had previous experience doing this.

Special Features

Additional features of the WSU on-line catalog that people like are:

1. The Welcome page for new students accessed off the catalog home page. This is the only page that is "dressed up" with graphics and provides links to catalog information and home pages for everything a new student needs to know about (e.g., admission, registration, etc.)



2001-2002 Catalog

Guidelines for New Students

Links to Catalog Pages	Contact Information & Links to More Info
Find out more about the University Academic Calendar	Student Recruitment Services (801) 626-6050 or (800) 247-3219
Apply for admission	Admissions Office (801) 626-6743
Plan for paying tuition (note deadlines) Scholarships & Financial Aid	Scholarship Office (801) 626-6029 Financial Aid Office (801) 626-7569
Tuition & fee amounts	Registration (801) 626-6746
Arrange for housing	Housing Services (801) 626-7275
Attend orientation	Student Recruitment Services (801) 626-8700 or (800) 257-3219
	Registration

2. A comprehensive listing of all degrees and programs with links to the requirements for each one. The table format allows a prospective student to quickly see what degrees/programs are

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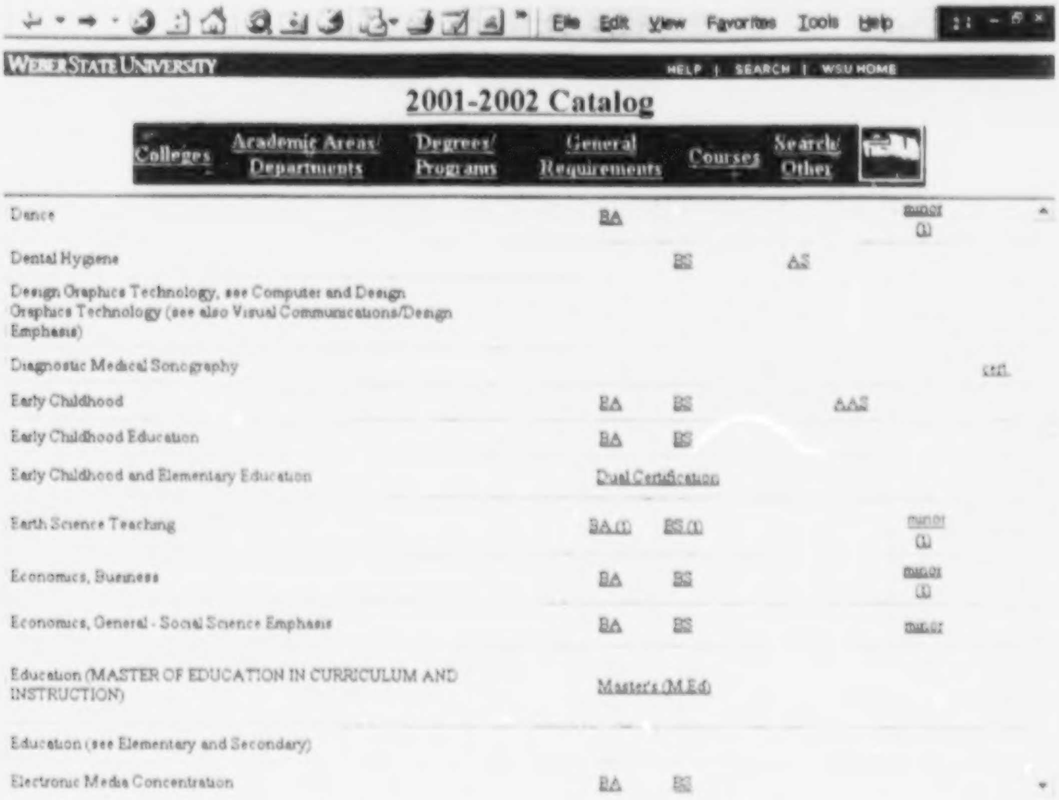

2001-2002 Catalog

Dance	BA				minor (1)	
Dental Hygiene		BS	AS			
Design Graphics Technology, see Computer and Design Graphics Technology (see also Visual Communications/Design Emphasis)						
Diagnostic Medical Sonography						cert.
Early Childhood	BA	BS		AAS		
Early Childhood Education	BA	BS				
Early Childhood and Elementary Education	Dual Certification					
Earth Science Teaching	BA (1)	BS (1)			minor (1)	
Economics, Business	BA	BS			minor (1)	
Economics, General - Social Science Emphasis	BA	BS			minor	
Education (MASTER OF EDUCATION IN CURRICULUM AND INSTRUCTION)	Master's (M.Ed)					
Education (see Elementary and Secondary)						
Electronic Media Concentration	BA	BS				

3. The addition of PDF files as an alternative for those wanting view pages of the catalog that match the printed version of the catalog. This feature is accessed by about 10% of all catalog visitors.

Advantages

Most importantly, a well-designed on-line catalog provides easy access to the information required most often. In addition, using an on-line catalog provides consistency for the way course requirements are listed on the Web. Departments can easily put a link on their home pages to the appropriate section of the on-line catalog, and the catalog can then link back to department home pages, thus providing a cohesive integration.

A big advantage to an on-line catalog is that changes and corrections can occur mid-year. The WSU on-line catalog identifies significant changes on an errata page (found under the Search/ Other menu option).

With an on-line catalog, it is easier for departments to submit corrections and updates since they can simply go on the Web, copy the text from the on-line catalog, paste it into their word processor, edit it, and then submit the edited text to the appropriate person(s). Once more, if you use a program such as FrontPage, you can give access rights to different individuals you've trained, and they can make updates directly to the on-line catalog.

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By using the on-line catalog as the primary catalog and downloading it once a year to the printed version, there is no duplication of effort. To download the catalog, all the files under the pages directory are copied onto a disk. They are then imported in the appropriate order into the desktop publishing program used to format the printed catalog. The program WSU uses is PageMaker. PageMaker has an HTML import that allows you to specify the PageMaker style to use for each HTML style. There is still some "clean up" required, but a lot of it can be eliminated by planning and coordinating the use of HTML and PageMaker styles and limiting the use of HTML tables.

The net result is that both an on-line catalog and a printed catalog can be produced with no more effort than it takes to produce just a printed catalog. For example, at WSU the process for catalog updates used to be:

1. Input curriculum changes once a year.
2. Send printouts of the catalog to each department.
3. Each department edits the printouts and returns them.
4. Corrections and changes are input and new printouts are sent to departments.
5. Departments proof the printouts and return.
6. All final changes are input, layout completed, and the catalog sent to press.

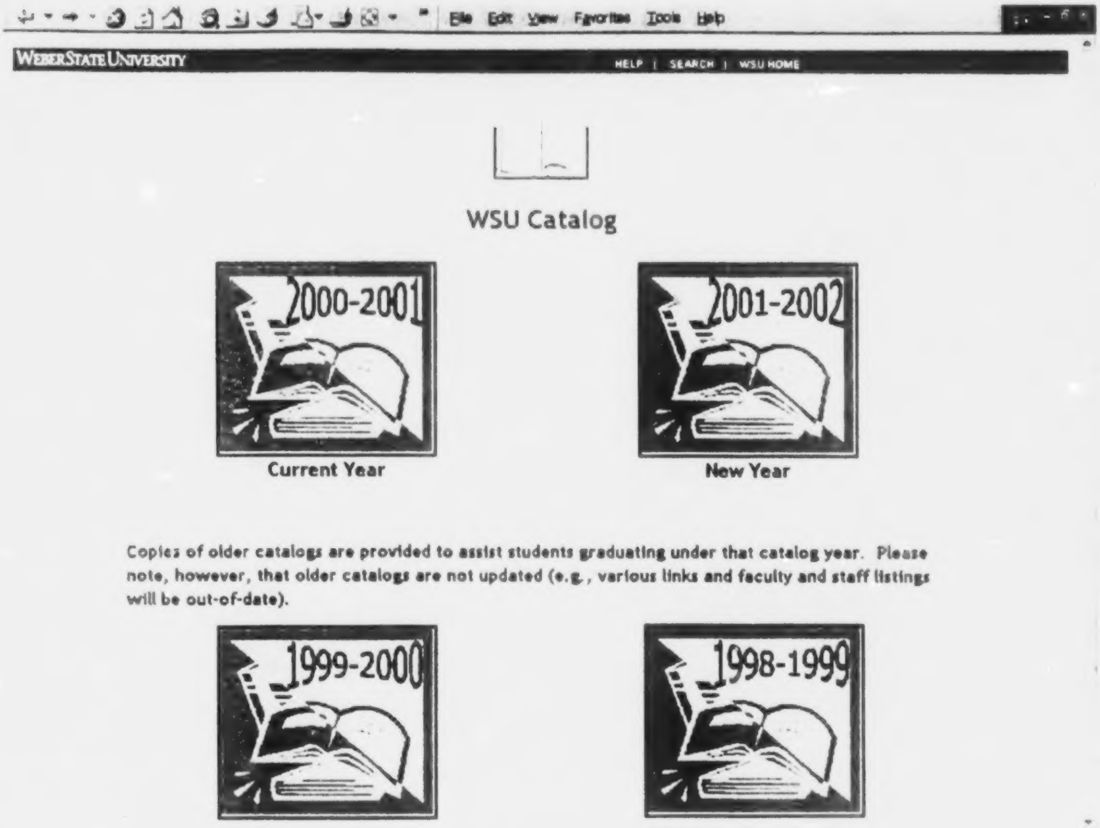
The disadvantages to this process: departments tend to wait and submit all their curriculum changes all at once, waste of paper, time consuming, many of the changes are hand written and not always legible, and requires manual input and thus a greater chance of error.

Now, however, the process is:

1. Corrections are made to the catalog throughout the year.
2. The current catalog on the Web is copied to the new-year catalog and curriculum changes for the new year are input.
3. Departments are notified by e-mail to check the new year catalog.
4. Departments review the catalog on the Web, copy and edit the text accordingly, and e-mail the changes back.
5. The changes are copied into the catalog on the Web for departments to review again.
6. Text is downloaded from the Web into PageMaker, layout completed, and the catalog sent to press.

The advantages are that curriculum changes can occur at any time, paper is saved, and the text is copied and pasted rather than retyped and so the process is much more efficient and accurate.

After several years one additional and important advantage to on-line catalogs is you can provide an easily referenced archive of catalogs for different years. WSU is not unique in that students are allowed to graduate using the requirements listed in the catalog that is in effect at the time they file for graduation, or they can use the graduation requirements listed in the catalog in effect when they first enrolled, provided they don't use a catalog more than six years old. By keeping different years of the catalog on-line, it is much easier for students and advisors to reference the appropriate catalog year.



WSU Catalog

Copies of older catalogs are provided to assist students graduating under that catalog year. Please note, however, that older catalogs are not updated (e.g., various links and faculty and staff listings will be out-of-date).

Suggestions and Lessons Learned

It is critical to involve students and academic departments in a cooperative effort to design, create and maintain an on-line catalog. This will greatly enhance the usefulness of the catalog and allow for different tasks to be delegated. At Weber State University the responsibility for compiling and producing both the on-line and printed catalogs falls to one person, believe it or not, and represents only ten percent of that person's overall duties and responsibilities. If it were not for the assistance of academic departments and students, this could not be accomplished.

Encourage departments to link to the on-line catalog rather than duplicate the information on their Web pages. This will provide integration and also eliminate those pages with old information that someone forgot about or didn't have time to update. Some departments may prefer to link to the individual catalog pages rather than the frames pages, so it is a good idea to indicate at the bottom of each individual page the institution name and the catalog year.

Be sure to provide a clearly marked link to a feedback form that forwards the feedback to one individual responsible for routing the variety of questions that will be received. The feedback is also invaluable to determine what students are looking for most so that helpful tools can be created. For example, such feedback prompted the creation of the Guidelines for New Students page in the WSU catalog.

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Test your catalog in both Netscape and Internet Explorer and at different screen resolutions. If using tables, be sure to specify the width of the table as a percent (100 percent or less) rather than a set number of pixels. This will ensure that the contents of the page will fit within the width of the frame so that a person viewing it will only need to scroll vertically and not horizontally as well.

Summary

The key to a successful on-line catalog is simplicity, organization, integration, helpfulness and teamwork. Simplify the design by keeping graphics to minimum and concentrating on providing straightforward information formatted so it is easy to read. Organize the information by section (e.g., department descriptions, degree/program requirements, course descriptions) using separate HTML files and then piecing the right combinations together with the use of frames pages, remembering to use a clear, consistent naming scheme. Integrate the catalog into the institution's Web site with easy-to-find links to the catalog from both the main and departmental home pages, and vice versa. Provide helpful pages such as guidelines for new students that group information to meet different needs. Work as a team to develop and maintain the on-line catalog as a cooperative effort among faculty, staff and students.

Since a printed catalog in many ways is considered by students to be their higher education "Bible," an on-line catalog should be no less important. A good on-line catalog does not take divine intervention, however, just a little planning.

You can view the Weber State University On-Line Catalog at http://weber.edu/catalog

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Becoming a Cisco Networking Academy

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Becoming a Cisco Networking Academy is as simple as filling out an application, sending it to Cisco, and waiting to see whether your institution is approved. If your institution is ready to make the necessary commitment and Cisco wants you as a partner of the Cisco Networking Academy family, then great. Welcome aboard!

It takes more than just desire to become part of the Cisco Networking Academy Program. Your institution must be a nonprofit organization and have a desire to make a difference in people's lives. Consider these important questions. Why would our institution want to become a Cisco Networking Academy? How would we benefit from becoming a Cisco Networking Academy? And how can becoming a Cisco Networking Academy enhance the services we already offer?

As we look at networking today, it is more than simply a high tech means of replacing sneakernet for a company. The industry has advanced from sharing data and information from within an office, between offices in the same building, and between buildings, to sharing data and information around the world. Growth of the Internet over the past 10 years has been astounding. Just look at the number of times each day people access information on-line. As PCs become faster and more efficient, Internet use puts a greater burden on local area networks (LANs). This is due, in part, to the type of information accessed via the Internet. The burden on LAN infrastructures has become greater. More users are downloading graphics, video, and now streaming video.

What's a LAN Administrator to do? Doing more, wanting more, expecting more out of existing outdated LAN infrastructures seems to be the mindset of everyone today. The problem is, when it doesn't work, calls are made to the network administrator to make it work. It is the network administrator's job to perhaps make the impossible happen on networks that were not designed to handle such a load. Possibly the network administrator was not trained or educated in the field of networking. Therefore, he/she cannot fix the problems. Isn't it the network administrator's job to make the network fast and efficient, and fix problems before they cause interruptions in service? When one clicks on the Internet icon the desired site is supposed to be there two seconds ago!

Network administrators need the proper tools to do their jobs. One of the most important tools is proper training in building and maintaining networks. Hence, the educational institutions enter the picture. The traditional method of education has shifted from teachers teaching to students monitoring and evaluating their learning and becoming more accountable. For years teachers have been teaching students but have our institutions always encouraged students to do as much as possible to help the process of their own learning? In order for students to be successful they must take an active role in the educational process.

Today, for individuals to become successful in the administration of networks they need more than academics and head knowledge. They need practical hands-on experience! Students are demanding that educational institutions provide them with skills-based learning environments that will prepare them for real-world situations and a job.

If we look at the age of students enrolling in colleges today, we see that they fall into certain categories: first-time enrollment out of high school, adults working full time, and adults returning to school to make a change in careers. Choosing a career usually depends on whether one can get a job upon the completion of one's education. According to Nicholas Basta's article "Information Technology, A Boom of Historic Proportions is Creating a Wealth of Opportunities " published in Industry Focus, "there is a shortage of trained information technology (IT) professionals. The shortage of IT workers in the United States and around the world continues to grow. The shortage of information technology workers in the United States alone weighed in at 850,00 for the year 2000. In the coming decades employers will be unable to fill positions due to a lack of trained specialists."(Basta pg 1) This is also confirmed by the META Group Report, "an estimated 850,000 Information Technology jobs would go unfilled by the end of 2000"(Business Editors, pg 1). The number of positions will likely continue to increase annually for the next 30-40 years.

Bills are presently before Congress to open the United States job market worldwide. This means that skilled trained professionals from other countries will be allowed to enter the United States to fill these positions. With such a demand within the industry, educational institutions have both the opportunity and the obligation to step in and fill the gap.

The Cisco Networking Academy program can help meet the demand for well-trained network professionals. Built on a system Cisco Senior Engineer George Ward developed for training teachers and staff to maintain school networks, the Academy Program was launched in October 1997 with 64 Academies in seven states. According to Cisco, the Academy Program was created to teach students how to design, build, and maintain computer networks at schools and academic institutions without IT or network support centers. Today, as the following table indicates, the program has grown worldwide.

198,884	Students enrolled
6,570	Academies (Total)
5,498	Local Academies
243	Regional Academies
790	Local/Regional Academies
37	Cisco Academy Training Centers (CATCs)
50	States (plus the District of Columbia)
121	Countries

from the Cisco Networking Academy Statistics: updated 03-30-01

"The Academy program provides a comprehensive E-Learning program that includes four semesters, 280 hours for the Cisco Certified Network Administrator (CCNA), and 280 additional hours for the Cisco Certified Network Professional (CCNP) program."(QAP pg 11) The Academy Program curriculum is Web-based allowing for updates and improvements to be made as soon as changes in technology and industry occur. Lab exercises provide hands-on work for students allowing students practical experience needed to understand how real-life systems work. Students really put their hands on equipment, performing all labs on equipment they configure.

Students are evaluated weekly by on-line tests provided by Cisco's Assessment Server. Skills-based testing also tests a student's practical knowledge. In trouble shooting equipment with a myriad of problems their instructors build into the equipment – along with some that just develop and are welcomed by the instructors – students demonstrate their ability to fix problems.

A question one may ask is, does the Cisco Networking Academy Program conform to any formal educational standards? The Cisco Academy Program adheres to all educational standards. The Cisco Program also follows the Secretary of Educations Commission On Necessary Skills (SCANS) guidelines for workforce skills.

The Cisco Networking Academy Program is set up to provide support at all levels of the Academy Program. Cisco's tiered structure allows oversight at each level. The following table depicts the structure.

SUPER CATC (Cisco Academy Training Center)
CATC
REGIONAL ACADEMY
LOCAL ACADEMY

(from the Cisco Quality Assurance Plan)

According to the Quality Assurance Plan and Academy Operations Guide version 2.1 published by Cisco in November 2000, each level has a parent above it and a child below it. The parent is responsible for guiding the child academy and for the continued education of instructors. Cisco's Quality Assurance Plan (Cisco Systems Inc.) states,

"Each Super Cisco Academy Training Center trains, supports, and monitors the instructors at CATCs. Each Cisco Academy Training Center (CATC) trains, supports, and monitors the instructors at the Regional Academies. Each Regional Academy (RA) functions as a hub supporting the ten Local Academies (LAs) in its geographic area and providing links between these LAs and the parent Cisco Academy Training Center (CATCs). Regional Academies must train instructors and support LAs. Local Academies (LAs) are non-profit institutions and community-based organizations that teach individuals the knowledge, problem-solving abilities, and critical thinking skills they need to pursue a career in networking and succeed in the workplace."(QAP pg 2)

Hands-on lab environments allow students the opportunity to work with actual equipment, not just simulators which are software-driven. Students having difficulties making equipment work, gain hands-on experience with troubleshooting. This enables them to finally feel success when it is repaired and everything runs. Students have commented many times regarding the fact that if it works right every time in the lab, a moderate amount of learning takes place. However, if it doesn't work in the lab, and the student has to fix it, then a great amount of learning takes place. Instructors can build problems into the lab and then monitor how students working in teams or individually trouble shoot and make it work.

Student Assessment is provided through the Assessment Server. Students log on via the Internet and complete on-line exams. The assessment process provides a means for instructors and students to evaluate student progress. Student scores can be measured to worldwide averages so that a comparison can be made as to where each student fits within worldwide mix of readiness to enter the job force. Administrators can compare teaching effectiveness and individual teachers can get immediate feedback on which topics students are mastering and which they need additional training. The frequency within the assessment process provides students with feedback on the areas they need to focus.

In conclusion, we in technology education in the United States have an obligation to fulfill. Becoming a Cisco Networking Academy benefits both school and service community. It allows others to see that your school is indeed keeping up with the technology age while providing training that will place your students in good paying positions. The question before you now is: will your institution step in and fill the gap?

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Breaking Away from the Desktop: Applications that Synchronize PocketPCs and Campus Database Systems to Support Your Mobile Learning Community

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Abstract

Imagine using a device that weighs less than a pound, fits in your pocket or purse, and has the power to run MS Office, as well as Internet applications! That device is the PocketPC. Campus demand for this hand-held device will grow as more education-focused applications are created for these Windows CE Release 3 devices. ABT will share lessons learned from its experience writing software for PocketCAMPUS, a suite of mobile applications that bring the benefits of mobile computing to administrators, faculty and students.

Tailoring ASP Services for Institutions of Higher Education: The Importance of Performance Contingency Planning

David K. Moldoff
ABT

Abstract

Advances in Internet communications and thin-client technologies have created an opportunity for institutions to get the benefits of application software without the large, up-front investments associated with licensing, installing and supporting that software on campus. Institutions with limited budgets and/or small IS departments can now "rent" their mission-critical administrative- and student-information system software from Application Service Providers (ASPs). ABT, having negotiated the industry's first two ASP service contracts for administrative software, will share its experience crafting PowerCAMPUS ASP service agreements with performance contingency plans that address the risk-management issues of educational institutions. Lessons learned implementing thin-client systems and providing remote systems- and application-support services will also be presented.

(These papers were not available at the time the Proceedings went to press. The author will supply copies of the papers at his talk or provide a url if they are posted on the web.)

Comprehensive Ubiquitous Computing: Beyond the Laptop Initiative

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Introduction

Longwood College is one of 15 public four-year institutions of higher education in the Commonwealth of Virginia. Located in Farmville, a very rural community, Longwood has aggressively approached using technology in all aspects of student learning. Although there were many reasons for our technology initiative, one of the more pressing reasons was recognition that the College, while educating citizen leaders dedicated to the common good of society, must provide a technologically literate graduate. Longwood recognizes that in Virginia alone in 2001, there are more than 20,000 unfilled high tech positions. The Commonwealth's system of higher education is expected to help fill these positions.

Longwood's response to this need is its ubiquitous technology initiative. At Longwood, technology permeates every aspect of the educational experience. Every student and faculty member has access to the latest technology. As examples, faculty members have a high-end personal computer and a network connection in their offices. All students are required to have a laptop. As a result, the College now requires that students and faculty meet high levels of technological ability and understanding. The result is a Longwood graduate with technology competencies in basic computer skills and in depth, discipline-specific technology skill sets.

Like most institutions, Longwood College was not always in this "technology position". Five years ago, technology at Longwood was very limited. Technology consisted of a telephone system, an IBM series 9000 mainframe, three computer labs for a student population of approximately 3,200, a "Helpless" Desk, a few faculty computers, and classrooms equipped with blackboards. High tech classrooms included overhead projectors.

Longwood College did a self-assessment and then planned and implemented a holistic approach to campus technology. There are two primary components, student technology and instructional technology. Again, the goal was to ensure that all students are prepared to enter the workforce with a high degree of technical skills. The technology experience starts with the admission process that along with payment is done entirely electronically. At Freshman Orientation, all placement testing is done on-line. Technology at Longwood College is a freshman to graduate experience. As a result, the College is bound to provide a technology infrastructure and support throughout all parts of the academic lives of our students. Longwood provides its students with a myriad of technology learning experiences before graduation.

The College, while placing resources on the student side, did not neglect the instructional components of ubiquitous technology. The goal here was to provide faculty with technology training and tools in order to improve the quality of instruction. Five years ago, all full time faculty received high-end computers with a connection to the Internet. The Instructional Technology Teaching and Learning Program (ITTL) was designed and implemented to provide faculty with the understanding of software programs used in instruction as well as the support that they need in order to integrate technology into the curriculum. Finally, the ITTL program provides a high tech classroom infrastructure so that the faculty can apply in the classroom what they learned in training. One of the most important components of ubiquitous technology at Longwood is assessment. Our Office of Assessment is constantly assessing outcomes of all components of this program so that we can see what works, and fix what doesn't work.

Student Technology

Our Student Technology component began with our laptop initiative. Four years ago, all freshmen were required to purchase a laptop. The College also provides within the residence halls a high-speed data network at the ratio of a port per pillow. Network connections are also available in the Library, classrooms, informal study spaces, the Dining Hall, in two apartment complexes in town and with commuter dial-up. Several student technology programs have been very successful. The Residence Technology Associates (RTA) program provides all students support with their laptops. The Instructional Technology Associates program uses students to provide faculty and academic departments support in integrating technology into the curriculum. Finally, Information and Instructional Technology Services supplies internships to students at the College who wish to gain academic credit and learn more about technology in higher education.

Many institutions ask us why the laptop initiative was ever adopted at Longwood. Prior to our mandate program, we had 1 computer for every 21 students on campus. Our computer labs were plagued with long lines, especially at the end of a semester, and disgruntled students and faculty. We were at a crisis point in instruction. The laptop program was designed to provide direct support for word processing, spreadsheets and databases. The laptop was to be an access device for course materials. It was to be a research tool providing students with access to our Library and to the Internet. The laptop was to be used as a communications tool linking students with students, and students with faculty.

The laptop initiative would guarantee that computers were available to 100% of the students 100% of the time. Because most if not all of our students would buy off of the contract that the College negotiated on their behalf, faculty and support staff would have a know quantity in instruction. We would know the software image on the student laptops as well as the hardware configuration. Rather than having 900 freshmen each with their own type and configuration of a computer, we would have 900 freshmen with the same type of software and hardware-a support dream. The College was also looking for a level playing field for all students. We did not want a digital divide on our campus with some students being able to afford computers and others left out. The College worked aggressively with the Office of Financial Aid to ensure that no student would be left behind. Our goal was to provide our students with the tools of today, help them master them so that they could graduate and learn the tools of tomorrow.

Longwood also provides its students with various opportunities in technology. The RTA program provides students in the residence halls, local apartment complexes, and commuter students with support after 5:00 PM and on weekends, when our Helpdesk is closed. These students are the most technologically sophisticated on campus and come recommended by faculty. They are put through a 40-hour technology boot camp each summer before the start of the academic year and are also taught the elements of good customer service skills and communication. In return for their hours, they are compensated with free room and board. The ITA program is very similar. Rather than provide support to the student population, the ITA's are Information Technology's direct link to the academic departments. They work one-on-one with faculty in their offices and in the classrooms. They also assist entire academic departments with technology projects. Like the RTA's, the ITA's are compensated with free room and board. Students at Longwood also serve as interns in our networking department, in Instructional Technology Services, and with our Systems Analysts and our Information Security area. The College also provides student web space for individual student needs as well as space on a web server for required web-based portfolios.

Instructional Technology

The Instructional component of the Longwood ubiquitous computing initiative is equally comprehensive. The College has ensured that there is a computer with an Internet connection on every faculty desk since 1995. Included with this is a refresh program on a three year cycle. The ITTL program, also started in 1995 trains faculty in all aspects of instructional technology, from the use of web-based course management software, to the use HTML editors such as Frontpage 2000, to the implementation of wireless technologies in the curriculum. Faculty training is assured through the ITTL program. The ITTL program also offers summer research grants in the form of equipment for faculty. There is also a reassign time competition in which faculty submit proposals to use technology to retool a course. In exchange, the ITTL will pay for a course release by hiring an adjunct. The ITTL program also provides funds for faculty who wish to pursue training off campus.

The ITTL program is also responsible for retrofitting classrooms with technology. Currently 45% of all classrooms on campus are multimedia capable. A multimedia classroom has as a standard a high-end Pentium computer, an Internet connection, a visual presenter (Elmo), a vcr, a Crestron control panel, and an Extron switch. Our goal is to have 98% of all applicable academic spaces retrofitted within the next three years.

The ITTL program also provides classroom specialists to guarantee that classroom equipment is fully operational. Our goal is one classroom specialist for every 30 classrooms. The program has also hired an Instructional Technology Design and Development Specialist who works with faculty in training and in incorporating technology into the curriculum. This staff member is also responsible for the ITA program.

Virginia as a state is really looking towards higher education to provide a technologically literate graduate for the market place. Longwood is "under the gun" as are all state institutions of higher education. To this end, the Institution has contracted with Smartforce CBT to provide computer-based training for the students, faculty, and staff. As a result, students, faculty, and staff have access to over 200 titles of training ranging from basic Microsoft Word, to Advanced Access, Oracle, and Firewalls and Routers and Switches. The modules are housed on the Smartforce server and are accessed through the Internet. Students have the option of doing the training on the Internet or downloading the modules onto their computers. Students are required to do the training and first take a pre-test. If they fail the pretest they do a module (which takes 4 to 5 hours and can be done in increments if the students so wish) and then take a post test. When they finish the module (if they are not doing it live play on the Internet), they log on to the Smartforce site again and their test score is removed from their computer and put into the database to which our Director of Assessment and Registrar have access.

The class of 2004 was required to complete their modules and testing by November 23, 2000. The areas they completed were:

- Basic and Intermediate MS Word
- Basic PowerPoint
- Basic Excel
- Basic Internet Explorer 5.0

The students have until the end of their Second year to complete all training and testing. The results are posted on their transcripts as non-credit bearing courses with a grade of P or F. All tests are normed nationally as there are more than 3000 institutions of higher education and industry who use Smartforce for training.

Outcomes

As stated previously, assessment drives this initiative. What have we discovered? I look at the results and I am not impressed and yet, when I compare what we are doing and the results we are getting with the Campus Computing Project, I understand that Longwood is far ahead of the curve. The numbers do not lie. 94% of our faculty require students to use computers outside of class. 80% of the faculty require use of the web by students. 77% of the faculty use the web in conjunction with classes. The data show that Longwood seniors use technology significantly more that seniors in national benchmark institutions.

To continue, 40% of our faculty regularly teach with computers in a lab setting. Almost 50 % of the faculty require students to use presentation graphics in class (PowerPoint). More than half of the faculty regularly discuss copyright and technology ethics in class. The Institution just rolled out Blackboard's CourseInfo in September 2000. In 4 weeks the faculty placed more than 300 courses on line.

One has to ask what the satisfaction on campus is with our technology. 96% of the faculty are more than satisfied with the technology in their offices. 92% of the faculty are satisfied with the technology in the academic computing labs. 94% of the students are satisfied with the service from our laptop vendor. 92% of our students are satisfied with the support our Helpdesk supplies.

All in all, we are very satisfied with what we have provided our students, faculty and staff. Our approach has been proven by our market. Our faculty are extremely satisfied with the technology in the classrooms. Our students find that the laptop initiative, our network infrastructure, and our wireless endeavors are very successful. The market has proven our approach. Longwood College has the highest non-military job placement rate in the Commonwealth of Virginia.

The Possibilities and Perils of Streaming Multimedia to Students

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Introduction

At most technology conferences we attend there are usually one or more references to the MTV generation of students we now find in our classes. It is given as one of the justifications for including more audio, video and graphical presentation in our classrooms. But we don't need to blame TV to defend the use of multimedia. Research has well documented that the human brain processes visual information more effectively than auditory information, and that graphical information is preferred over text. Furthermore, information is stored and retrieved more effectively if learned through multiple modalities. If we ask what the brain likes most in processing information, visual imagery is near the top.

However, among the three characteristics of information that the brain likes best -- visual imagery, organization and meaning -- meaning is king. If the brain cannot extract meaning from the information, visual or not, it will usually be lost. So, what we intend to do today is to describe our early attempts to use two *multimedia* tools in the service of *meaningful* pedagogical goals.

In particular, we first looked into streaming media over the Web because for us, as I'm sure it is for you, the Web is becoming a primary conduit for teaching and learning. When media is "streamed," it is significantly compressed and then delivered almost instantaneously on demand by the receiver. Prior to streaming media, delivery of audio or video over the Web meant the receiver had to first download the media, which could take an hour or more for even a short video clip, and then open the downloaded clip to view it. With streaming media, when the user clicks on a link to a multimedia file, assuming the presence of the appropriate plug-in, the audio or video begins playing in a matter of seconds. No downloading is required. And the user can go back to that link anytime and restart the file in a few seconds.

As it is at your schools, many of our faculty are moving beyond the course Web site as just a repository of course materials. We want to deliver additional *learning* outside the classroom, and the course Web site is an excellent vehicle for linking to supplementary material, providing students access to interactive exercises and reviews, promoting discussion and more. Additionally, we saw the course Web site as a vehicle to deliver direct instruction. But we did not believe that simply posting course materials or class notes would effectively capture it. The typical classroom usually contains multiple modalities of instruction as the teacher verbalizes concepts in concert with using the blackboard or PowerPoint slides or video or hands-on work in a lab.

We were not asking for much. We just wanted a tool that could extend our instruction beyond the classroom without overloading the network's or the user's bandwidth. We needed a tool that would not have a steep learning curve for either the instructor or the students, that would not be too time-consuming to use and that would allow for the delivery of instruction in multiple modalities while meeting meaningful pedagogical goals. Fortunately, such tools are readily available through the RealNetworks, QuickTime and Windows Media platforms.

We selected the Real Platform as our streaming media delivery system and its accompanying media creation tools, RealPresenter and RealProducer, for several reasons.
First, limited free versions of RealPresenter, RealProducer, and RealServer are available from RealNetworks which made it easy to experiment with them before making an investment. Information Technology Services (ITS) and the student video organization on campus used this free version of RealServer, which supports sending out up to 25 free streams, to Webcast our commencement 2 years ago and the homecoming football game this past year. The radio station then used those streams to audiocast its programs on the Web. So when we decided to venture into streaming media to augment classroom instruction we already had some experience with the Real products.

To be sure that the Real products were the best for our use however before investing in the full package versions, ITS did a comparison of available products. They found that the initial purchase cost was lower with Microsoft's Windows Media products, but that long term costs were lower with the Real products since they were more stable and required fewer ITS resources to support them. In addition, Real products had the advantage of allowing content to be created, viewed, and delivered on a wider array of platforms than comparable products. For example, RealNetworks has players, content creators, and servers for Windows, Macintosh, and Linux. If we were going to create content for student viewing we wanted it to be available to as many people as possible on as many computing platforms as possible. In addition, while most of our campus uses Windows 95 PCs, Macintosh computers are used in several departments including the Language Lab and the Art Department -- excellent candidates to create content for the streaming media server.

So the decision was made to go with RealNetwork and to purchase a setup capable of delivering content to 100 simultaneous viewers. The cost of the server hardware and all the software and licenses was almost $12,000. But we had already been "testing" the waters for several years and were ready to commit to a system that would allow us to expand its use across the campus in years to come. A college interested in just getting started can start for free, as we did, and then, if they wish, set up a more modest full system for about a third of this price.

Using Streaming Media to Support Class Instruction

We wanted to proceed cautiously and start small by experimenting with, and assessing the effectiveness of, streaming media in a number of disciplines. So, during the Spring of 2000, faculty at North Central were invited to join in a pilot project to develop multimedia instructional materials that could be delivered via the Web. Six professors in areas ranging from Political Science to Philosophy to Business signed on to develop materials during the summer of 2000 to augment one of their 2000-01 courses. One professor, Judy Walters of the Computer Science department, decided to design and create materials to support a fully on-line course even though North Central had no previous history of any Web delivered courses. Other professors in areas such as French and Psychology, while not part of the official Web "group," also got involved in making similar materials to enhance their courses. Following is an account of two of these experiments.

Using Streaming Media in a Face-to-face Course: Introduction to Psychology

As I (Jon Mueller) have learned from my attendance at prior ASCUEs a few of our schools are heavily into distance learning but most of us are, and will continue to be, primarily providers of face-to-face instruction. So, my particular interest in these tools and the interest of most of our faculty is in the tools' ability to enhance the teaching and learning of face-to-face courses.

Recently I taught a psychology of humor seminar. At one point in the course I passed out a humorous piece in which a faculty member said that instead of thinking of students as just lazy or unprepared anymore, he realized that they likely suffered from syndromes or disorders. For example, he described the Attendance Aversion Disorder and others. I gave my students a chance for retaliation by asking them to construct a little humor, specifically some disorders or syndromes they believe some faculty suffer from. Needless to say, my students were quick to identify several such disorders, including the First-year Faculty Over-exuberance Syndrome. This is characterized by a 15-page syllabus, assigning 52 books and some other characteristics I cannot remember. It reminded me of my first days out of graduate school when I believed my mission was to impart to students a multitude of great ideas they just had to know about.

Gradually I learned that throwing a lot of information at my students was not sufficient or appropriate. I had to help them construct their own meaning from the material. That meant using class time to actively engage them in thinking, reflection and application. Content was still important, but I felt content could more easily be delivered outside of class than could the guidance of the students' thinking. So, I wanted to find a way to provide more of the content outside of class and to engage my students in meaningful, active learning during class time. I've found that RealPresenter, which allows the creation of streamable PowerPoint slides with accompanying audio, supports that goal.

I could just post my course notes on my Web site to give my students some of the content I would normally present in class, but I do not think many students would read them thoroughly, and it really does not capture the feel for what I am presenting. With RealPresenter, on the other hand, students can view my PowerPoint slides while simultaneously hearing my narration of those slides. They hear my intonation, my pauses. I can stop and ask questions as I would in class. I can intersperse review and humor. I can better capture the feel and impact of the classroom. And students can go back and replay the entire presentation or selected portions to review specific topics.

This past winter I created a couple of such presentations in my Introductory Psychology course and posted them on the course Web site for students to view. One presentation captured a lecture I gave in class and another summarized some text material that I was not planning to cover in class. Since this was just a pilot project, I did not require students to view the presentations or include in them material they could not find elsewhere. However, I asked them to try and view the presentations from wherever they normally access the Web. Some of the students viewed the RealPresenter lectures from on campus and some from 56K modems off campus. Although there were a few technical problems I will detail later, most students reported they were minor and that they found the media clips both helpful and engaging. I will be creating more this summer so they can be more intentionally incorporated into my Introductory Psychology course this coming fall.

Using Streaming Media in an Online Course: Problem Solving Using Spreadsheets

Since about half of the Computer Science students at North Central are working adults, we offer class in evening and weekend formats, in addition to in traditional daytime formats. However we had never, until last winter, offered an Internet course. As a small college with Liberal Arts roots we value small classes with close teacher-student interaction and tend to attract students who prefer that type of learning environment.

When the administration approved my (Judy Walters) proposal to offer a fully on-line course it was because it was just one section of a course that runs about eleven sections a year in a variety of formats. Thus it was consistent with our policy of offering students a choice of formats and delivery methods and no student would be forced into this section in order to take this course. A student would have to choose to enroll in it and steps were taken to make sure students were aware of what they were choosing so no one stumbled into it inadvertently.

Having made the decision to offer the course in this format, the challenge became how to maximize the benefits of such a delivery method. That is, my goal was not just to try to create a Web based distance education course that was "just as good" as a traditional class, but rather to exploit the potential of the medium to draw the students into a learning community and provide them with advantages beyond what a traditional class offered. Since I teach several sections a year of this course in both day and evening formats, it allowed me to assess how well this goal was met by comparing both learning outcomes and student satisfaction levels between the Internet section and my regular sections. The details of that assessment and the conclusions drawn from it are the subject of another paper, but the results were highly encouraging.

Having studied Internet delivery models for some time I knew I wanted to create an on-line course that was divided into learning units with assignments due at specified regular points in the course. As with a traditional course, students would have a full syllabus at the beginning of the course, but lessons and assignments would be made available on a weekly basis. This is very different from self-paced computer based training which, while it has its place, does not create a sense of community or allow students to work together on common projects. Our extensively used WebBoard and shared network directories allowed students to communicate regularly with me and with each other throughout the course. Introduction of new material and review was handled through the use of RealPresenter and RealProducer streamed materials -- some of which I will be demonstrating in this presentation.

The class began with 24 students, the same size as our traditional lab based courses and, after a drop, ended up with 23, about the same as with a normal class. All of the students either lived on campus or were commuter students. But we wanted to simulate as closely as possible a true distance class, so the ground rules disallowed any student coming to see me for help. All office hours and help were handled via the Internet using email, WebBoard, Instant Messenger and Chat.

From detailed surveying we learned that the students who chose to enroll in this section really liked the freedom of "anytime anywhere" learning. That is, the commuter students were all viewing course materials and working from home and almost all of the on-campus students were working from their residence hall rooms instead of coming to the campus computer labs.

Before the course even started RealProducer and RealPresenter played a key role since it was necessary to use the technology to teach the prospective students about the technology and what to expect in the course. The first step was to set up an extensive Web site which contained this information as well as tutorials on how to use WebBoard and Chat, how to use network directories and submit homework, etc. After the Web site was set up, and six weeks before the new term began, a letter was sent to all the enrolled students, detailing the technical requirements they would need if they chose to work from off campus and providing information on how to download the free RealPlayer they would need for the course from the RealNetworks Web site. Students were directed to the course Web site where they began getting acquainted with their future teacher via a "Welcome to the Course" streamed video and where they were given a set of pre-course assignments that needed to be completed by the first "day" of class. These involved such things as viewing RealPresenter and RealProducer clips, getting onto the course WebBoard and making an "Introduce Yourself" posting, and setting up their N: drive directories -- all things necessary to be able to function in the course. They were also required to send in a digital photo of themselves (taken with a digital camera or scanned in, etc.) that would be placed in the class photo gallery I was setting up.

Once the course was fully underway, streaming media filled the critical role of introducing and demonstrating new techniques and concepts. I feel I was able to do this as effectively through the media presentations as I could have in the classroom -- and student feedback supports this. As you will see when I show you one of the clips, these presentations are far from the set of bullets that come to mind when one thinks of a traditional PowerPoint lecture. Instead, since this class teaches the use of Excel spreadsheets, they consist primarily of dozens of Excel screen shots captured via software called Snagit and placed on PowerPoint slides. By using enough of these screenshots the student can view a set of actions taking place and their results as the streaming media show moves seamlessly from one slide to another while the instructor talks the students through the process -- just as if it were being demoed in a traditional class.

Advantages and Effectiveness of our Uses

Using streaming media did more than just replicate the classroom experience though. It had advantages that can't easily be duplicated there. For one thing it provided great convenience as students could view the demos at the time and place of their choosing. More importantly it allowed instruction to be differentiated between students. We discovered that stronger students were skipping demos on subjects they already understood, while students who needed more reinforcement were following a process of viewing the demos, attempting to do the follow-up assignments, and then sometimes going back and viewing selected materials again if they found they had missed something.

Had I (Judy Walters) relied on streaming media alone to teach my class I am convinced it would have been a disaster. By using it as a key component of instruction alongside other more interactive learning methods, it proved invaluable.

Regarding my (Jon Mueller) first attempts using streaming products, I was most excited by my psychology colleagues' reactions. I shared the presentations with them and they immediately saw the potential. For example, the department has gradually been turning our Introductory Psychology course into a scientific literacy course as we find so many of our students come to us unable to think from a scientific perspective. That has meant reducing the number of psychological concepts we cover so that we can engage them in more critical thinking. But RealPresenter will allow us to supplement our in-class coverage of content with mini-lectures we post on the Web. We can assign lectures to be viewed before students come to class and then use them as starting points for additional lecture or for discussion. Or we can assign a mini-lecture after an in-class discussion for review or to extend what was presented in class. Thus, we can present the content we want and still reserve some class time for those engaging activities that can best be carried out in that environment.

Additionally, a couple of my colleagues wanted to know right away if they could use one of my presentations in their courses. Once a RealPresenter presentation has been created, it is easy for anyone to link to it to use in a variety of ways. So, our department will likely build an archive of mini-lectures that any of us can link to at any time, much as we do with our video collection now. My colleagues cannot easily grab one of my live lectures and include it in their course, but they can easily utilize one created with RealPresenter.

How to Actually Make such a Presentation

The steps involved in actually making a RealPresenter or RealProducer presentation are fairly simple and straightforward, even though it can take a lot of practice to carry them out efficiently and to learn the multitude of little tricks that make the difference between a good or poor final result.

Making a RealPresenter streamed slide show is just a matter of

- creating a PowerPoint presentation, or taking one you have already made
- using RealPresenter to make .jpg files from the PowerPoint slides
- using RealPresenter to add narration or other audio input to each slide
- saving it as a streaming media presentation
- uploading it to your streaming server.

Making a RealProducer streamed video is just a matter of

- creating a video, which can be done on your computer with your Webcam
- telling RealProducer where to find the video file so it can use it as input to create a RealMedia file

- uploading it to your streaming server.

This may sound complex, but once you see it done, it is quite simple.

Perils of Streaming Media

Though easy to do once you get the hang of it, creating streaming media takes a lot of time. If you are just adding a voiceover to an existing PowerPoint presentation it may only take about 5 minutes for every minute of content you create (1 to 1.5 hours for a 15-minute clip). But if you are making a complex presentation from scratch that involves such things as shooting and editing video footage, creating a series of computer screen shots, taking and scanning in photographs, or creating complex graphics to include in your presentation, it can easily take a full day to make a 15-minute clip. Most productions will fall somewhere between these extremes, so a good ballpark figure is to count on it taking about ten minutes for every minute of content you create. Thus one would hope the clip would either reach a lot of students or be able to be reused.

In addition, although we would place RealPresenter and RealProducer in the category of easy-to-use software, there are always technical problems to be overcome. First, any time you are recording your voice, you need a quiet environment and a good microphone. We found that headset microphones created too much static and instead used tabletop microphones that came with the computer. After some experimentation we found a distance from the microphone and a voice level that provided a consistent sound level, but we still plan to invest in higher quality microphones before we make additional materials later this summer.

Second, if you want to make high quality video clips you need real video cameras and good lighting equipment. That is, a professional quality video will look professional when streamed. Quick easy-to make ones, like the ones we initially made with the little Webcams that perch on top of our PCs, look amateurish.

Third, without really high end streaming servers there can be an excessive time lapse for presentations to buffer before they start playing in RealPlayer. Even on campus, with a high-speed network, it took about 30 seconds or longer for our initial presentations to buffer. In contrast, a video clip, which presumably is a larger file size, appeared after only about 10 seconds of buffering at numerous commercial Web sites.

We have been able to reduce the buffering time by reducing the file size of the underlying PowerPoint presentation. This was accomplished with a number of steps. For one, we stopped making long presentations, creating instead sets of shorter, more focused presentations. In addition, we began using a color scheme instead of a PowerPoint "theme" for the slide backgrounds. We also started using fewer mouse clicks and transitions in the new PowerPoint presentations we were creating to convert to streaming media. Lots of bullets whizzing in may grab the students' attention and thus be great for a classroom PowerPoint presentation, but it is not good for streaming media. Every transition to a new bullet, as well as to a new slide, causes a delay and requires a pause in the accompanying voice over while the audio track is synchronized with the new slide. These steps have improved the flow of the presentation dialog and have reduced buffering time, but it is still much higher than we would like, particularly for slower connections to the Internet.

A fourth technical problem is that, since students will be viewing materials on a variety of platforms, with different size monitors and with different speed Internet connections, materials need to be created to work well in whatever you agree on as your lowest supported technical environment. If you are using the free versions of the Real software to create presentations you will have to make different streams for different delivery speeds, directing students to click on whichever link is for the delivery speed they need. One of the big advantages of using the purchased version of the software is that it can autodetect the speed of the user's modem so the same stream can be delivered to each student at the speed his system needs to receive it.

Fifth, following up on the previous point, materials you create need to be viewed and tested on a variety of platforms to make sure they display well for all of your users.

Sixth, we found that students viewing our material from home with slower modems could not view RealProducer streamed video clips well, even at 56K. Images were jerky and not well coordinated with audio. However even at 28.8K they could smoothly receive RealPresenter PowerPoint presentations. Therefore we used more of these and very few video clips.

And finally, seventh, there is always the possibility of the streaming server or Web server going down, making your materials temporarily unavailable. We have been very lucky to have reliable equipment that is up almost all of the time and ITS staff that monitor it regularly so it will not be down without anyone at our end realizing it.

In addition to technological perils, there are pedagogical perils of using streaming media.
Many faculty do not make heavy use of PowerPoint because investing a great deal of time in creating a whole course of lecture notes inhibits them from changing what they want to say or the order they want to say it in from term to term. It makes them feel bound to present material in a certain way just because they have spent the time creating slides. We believe this is of even greater concern when creating multimedia products which are flashier and which take even more time to create than plain PowerPoint shows. When you have created a tangible product like these presentations you are reluctant to treat them as disposable. The result we fear is loss of flexibility and a disincentive to update material to keep it fresh and current.

Another potential pedagogical peril with any tool that enables presentation of information is that if not used judiciously it can further lock the teacher into a presentation or lecture mode. The perception of many is that distance learning has become more effective as it has moved away from the talking head model and created more of a sense of community through a variety of synchronous and asynchronous communication tools. Similarly, streaming media is likely to be most effective when used in conjunction with other interactive and engaging components of a course, as Judy did in her spreadsheets course.

Improving the Effectiveness of Streaming Media

Having taught my (Judy Walters) on-line course once I have learned many things that will allow me to create better materials and use streaming media more effectively when I reteach the course next winter. Some of these insights came as a result of feedback gained through the student surveys I created and the focus groups I held once the course was over.

First, I plan to make still shorter and more focused materials. This facilitates component reuse and gives the instructor more flexibility (since she may want to reuse part but not all of a longer presentation) and, as mentioned above, speeds up buffering time in the delivery process. More significantly however, from the students' point of view, it facilitates their being able to make decisions about what to view once, repeated times, or to skip altogether. A number of students said they often wanted to go back and review the media clip on a key concept or technique they were unclear on, but didn't do it because it was part of a too long clip they didn't want to sit through a second time. I asked the students, "are you saying you would prefer three 5-minute clips instead of a 15-minute one" and they replied "no, we'd actually prefer five 3-minute ones."

Second, when I teach in the classroom I use a very active learning approach and I feel I can do more to make streaming media a less passive experience. The current clips do ask simple questions on the material just presented and pause while the student thinks about the answer. But when I remake materials later this summer I plan to incorporate questions that require a higher degree of analysis such as "How would you ..." and "What do you think would happen if ...." followed by a demonstration of the result rather than a verbal answering of the question.

Wading in the Stream

Along with many of you, we have started wading in the stream. As we have described here today, we got our feet wet, found out it wasn't too bad, and plan to return.

We want to get others to play in the stream with us, at least to try it out. Although streaming media will eventually be used by a variety of offices on campus (e.g. admissions), we have primarily targeted faculty to consider its potential. Within faculty, I have selected the most obvious group -- the current PowerPoint users. We have quite a few faculty who have created large collections of slides for their courses. We have starting given them some Real show-and-tells to expose them to the possibilities. As faculty slowly become interested in the possibilities of streaming media, we will then train them on the tools. We have a small computer lab that doubles as a faculty development lab. In an office connected to the lab we have one computer set up with RealPresenter, Real-Producer, a microphone, and a computer-top digital camera. Faculty are free to use that machine for training on the tools and to develop streaming materials.

We will be adding *Blackboard*, the Web based course management tool, to our network in the fall as well. As faculty become more familiar with *Blackboard* I believe they will explore other ways to distribute material to their students, and streaming media will become one of those tools. To help expose faculty to possible uses of technology in their teaching, we have created an Intranet resource called The Ideabook. It showcases our faculty utilizing technology in teaching, organized by pedagogy, discipline and tool. Soon faculty will be able to look here for examples of how streaming media can enhance their teaching.

Finally, although our foray into online learning is likely to be limited for quite a while, streaming media will no doubt become a significant piece of how we deliver that instruction. And if Judy's experience with it is any indication of its promise, we will be wading knee-deep in that stream before long.

Progress Report - Microsoft Office 2000 - Lynchburg College Tutorials

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ABSTRACT

For the past several years Lynchburg College has developed Microsoft Office tutorials for use with academic classes and faculty, student and staff training. These tutorials are "webbed" and available at no cost to anyone. Their popularity is now international and CD's containing the tutorials are mailed all over the world. At the 1999 ASCUE Conference, Lynchburg College introduced the Microsoft Office 97/98 tutorials. At the 2000 Conference, the FrontPage and Publisher 2000 tutorials were presented. At this year's conference the new Office 2000 tutorials will be previewed. This presentation will review the process for creating and revising the Office 2000 tutorials, and furnish an overview of the features of each tutorial and it's associated Microsoft product. Each participant at this session will receive a copy of the tutorials.

INTRODUCTION

In the early 1990's software tutorials were expensive and not specifically designed for academic use. At Lynchburg College the decision was made to develop specific, general use tutorials that covered the "most used" aspects of each Microsoft Office application - except Microsoft Word. The initial Microsoft Office tutorials were created in 1995.

Last year the FrontPage 98 tutorial was revised and a 2000 tutorial introduced. A Publisher 2000 tutorial was also created. This year the PowerPoint, Excel, Access and Outlook tutorials are available in a 2000 version.

GENERAL OVERVIEW OF OFFICE 2000 - GRAPHICS

The first thing one notices when browsing through the various modules in Office 2000 is that the major innovations seem to be with the more graphic modules: PowerPoint, Publisher and FrontPage. Each of these modules takes advantage of a new Clip Art Gallery that has significantly expanded features, images and sounds. Office 97/98 clip art contained only static graphic images. Clip Art Gallery 2000 retains the static clip art, but also includes high quality photographic images, a sound gallery and animated images. There are also significantly more images. The new gallery takes up almost an entire CD – or close to a gigabyte of information. The standard installation only loads about 10 % of the information because of the number of images. You have to activate the custom installation to load all of the information. If you don't have room for the information on your hard disk, you may insert the installation CD when the software indicates to do so.

The Clip Art 2000 Gallery also has a new feature, which is extremely helpful: a search feature. Now, you may enter a topic and the gallery will search for images, sounds or animations that fit the search criteria.

FRONTPAGE AND PUBLISHER 2000

With FrontPage 2000 Microsoft created a more flexible and powerful web page and web site creation tool. FrontPage 2000 combines the two separate modules form FrontPage 98 – Editor and Explorer – into a single screen with a task bar to move between the two.

Microsoft also recognized that many of the features that FrontPage 2000 creates will only work in the Microsoft Explorer browser. So, there is a feature that may be activated that allows FrontPage 2000 to only create web pages that will load in all browsers.

You will also notice, as soon as FrontPage 2000 loads, that in the lower right corner of the screen there is a small hourglass that indicates 28.8 seconds. This is an indicator of how long the page you are creating will take to load over a 28.8 speed modem! As you increase the length of your page, enhance images, add additional effects, this time will be ever changing to give you and idea of how long it will take other to load your web page. A right click of the mouse on this area will cause a pop-up menu to appear which allows you to change the type of cable or modem speed which you would like to use. As you change them, you notice logically, the load time increase or decrease. The default is the slowest modem that most folks use today.

Publisher 2000 contains a surprising variety of publications from newsletters, catalogs, brochures and flyers to calling cards, award certificates, greeting cards, menus, programs, origami and paper airplanes – and a whole lot more.

All of these features are detailed in the FrontPage and Publisher 2000 tutorials that were provided at the last year's conference.

POWERPOINT 2000

Many of the features of PowerPoint 2000 are very similar to those in the 97 version. The buttons and features are essentially the same. There is a new area down the left side of the screen that is a cross between the Slide Sorter View and the Outline View. It chronicles the presentation in slide order similar to the Outline View. Some find this helpful and some do not. This feature may be removed if it is not desired so that the screen resembles the "old" screen.

As indicated previously, the graphics oriented modules evidence the greatest changes. This is true in PowerPoint as well. A user is now able to include animations in PowerPoint slides. You may use the animations in the 2000 Clip Art Gallery or import your own. PowerPoint 2000 also "handles" AVI (audio-visual movie clips) much better that the previous version.

PowerPoint 2000 also handles a greater variety of sound "types" more effectively. It can accommodate MP3 sounds if there is a player installed. However, when a sound is associated with an image through Custom Animation, PowerPoint 2000 still only uses WAV files. With a few "tricks" you can essentially play any sound you desire with any slide (or slides) in the show.

Background templates are pretty much the same as in PowerPoint 97. There are a few new designs, and you can still access the 97 designs. However, due to the popularity of PowerPoint, there are a number of links to additional Design Templates in the PowerPoint section of the Microsoft web site. Some of these are pretty exotic. It's all a matter of taste.

The PowerPoint 2000 tutorial expands upon the 97 tutorial. Many users have requested that the areas of Custom Animation for text and graphics be expanded and explained in more detail. Also, in the slides where AutoShapes and Text Box are introduced, more detail is furnished about these features. The 2000 tutorial has expanded images to assist with understanding and mastering PowerPoint.

EXCEL 2000

As indicated, there are not a significant number of enhancements to the non-graphic modules. There are a few additional types of charts (graphs) in Excel 2000, but that's essentially the major change.

The Excel 97 tutorial was last revised in May 1998. It was the first tutorial created in the tutorial series. It appears to have withstood the test of time well. However, the 2000 tutorial is also expanded with additional images and text to make the tutorial more easily understood.

ACCESS 2000

As with Excel 2000, Access 2000 appears essentially unchanged from Access 97. There is a new "look" to the main selection screen where the user designates whether they want a Table, Form, Report, etc. But this is only appearance. The Tables, Forms, Reports, Queries, and associated Wizards, still "look" and "work" essentially the same.

The Access 2000 tutorial has also been enhanced with more images and additional explanatory text. Since many users have indicated that they now would like instruction on how to insert images in the database a new section has been created for this purpose. There is also expanded instruction in the area of Report creation. Users have indicated that more information about the Design Views be included. They also mentioned that a section on Mailing Labels would be a meaningful enhancement – so this has also been added.

FILE STRUCTURE

All of the Office modules (Word, Excel, PowerPoint, Publisher, FrontPage) use the same file structure as their predecessors. So, you may "go back and forth" from 2000 to 97/98 with no problems. Access, as with previous versions however, will not "go back and forth." The same finicky process that was necessary to "move" from one Access version to another still exists. Microsoft indicates that the new structure is necessary for the additional features. So, be warned that, if you desire to move between versions you will need to be prepared for this file structure hindrance.

OUTLOOK 2000

Once again the features of Outlook 2000 are not significantly different than those in Outlook 98.

Many requests have been received to expand the initial "Screen Views" section that allows users to personalize the "look" of their screen. There are also numerous requests to expand the instruction on the Address Book – especially how to include additional addresses to the Personal Address Book and more detail on how to create a Mail Distribution List (for sending e-mail to a specific list of users). Many additional images have been added to the explanatory text in this area of the tutorial. There is also additional attention given to the Out of Office Assistant and the Auto Signature.

CONCLUSIONS

As indicated above, the graphic oriented modules (PowerPoint, Publisher, FrontPage) evidenced the major changes from previous versions. The enhanced graphics and Wizards are significantly better than the 97/98 versions. Also, the "look" of the working screens are greatly superior to assist the user.

Excel, Access, and Outlook have only minor enhancements. However, the tutorials for these early tutorials are greatly expanded to include additional instruction in areas that users have requested.

A copy of the current "edition" of the Lynchburg College-Microsoft tutorials will be available to each participant at this presentation. If a participant desires a CD (which contains all of the tutorials, in both the 97/98 and 2000 formats) it too will be available.

All of the Lynchburg College-Microsoft tutorials (Office 97/98/2000) can be downloaded from:

http://www.lynchburg.edu/userguide/

The tutorials have become so popular internationally that they are being translated into French. So, we have created a CD, which includes all of the tutorials in Microsoft Word (English) - available at no cost to those who desire a copy. Simply contact me at one of the addresses on the first page of this paper if you desire a copy.

Technology and Education in a Rural Environment: Booth *Teacher* Training Initiative

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Pikeville College was founded in 1889 by Presbyterians with a mission of providing educational opportunities to people from central Appalachian. From its earliest beginnings the College has focused its curriculum on preparing young people for entrance to college and the training of much needed teachers. This statement was printed in an 1890 publication, "Me preparatory department prepares teachers for county examinations and to do better work in their fine of teaching-"

Today, Pikeville College views itself as an "opportunity school' where all students are welcome. The historical practice of "open enrollment' is testament to the College's efforts to improve the overall educational level of the population, enhancing the quality of life for as many individuals as possible. To greater ensure that the College effectively fulfills its mission, it provides a high quality education supported by a broad range of academic and personal support services, including developmental studies Program coursework, academic tutoring and a counseling program that provides academic and personal assistance. The College's tuition rate of $7,800 per year remains one of the lowest for private institutions. The College prides itself on meeting the financial aid needs of all students who wish to take advantage of the educational opportunities it provides. To help meet these financial aid needs, the College commits over three million dollars annually to scholarships.

The College remains committed to serving students from Appalachia. Research shows that many of the poorest counties in the nation are located in central Appalachia. Pikeville College recruits approximately 73% of its students from these poor Appalachian counties; thus many of Pikeville College's students come from homes with characteristics associated with living in an economically distressed area. A large percentage of the students who attend Pikeville College are first generation college students and a number of these students come from homes where neither parent graduated from high school.

When the characteristics of Pikeville College's primary recruitment area are considered, is it any wonder that the great majority of its students enter the College poorly prepared for academic success? The following profile of students at Pikeville College further emphasizes the challenges and opportunities facing the institution in its mission to educate the citizens of the region:

The average ACT composite score of Pikeville College's entering fiwhmen class for the Fall 2000 Term was 19.2, compared to a state average of 20.1 and a national average of 21 (Source: Pikeville College Institutional Research Office). Fifty-four percent (54%) of the entering freshmen were enrolled in one of more developmental courses. (Source: Pikeville College Fact Book, 2000). Ninety-five percent (95%) of the student body need and receive financial assistance in order to attend college. (Source: Pikeville College Institutional Research Office).

Many of the students entering Pikeville College today have dreams of becoming teachers. However, as evidenced by the information presented earlier, some enter the College poorly prepared for academic success, and therefore, require an extraordinary range of support services.

To respond to the challenge of preparing students who want to be teachers, the College has undertaken a broad range of program initiatives including:

- Revision of all educational programs to strengthen content preparation through additional course work, course revisions and innovative teaching strategies. Content course work in some majors was increased by as much as 25%, and all methods courses were revised to include *the* integration of technology and the use of assessment to improve teaching.

- Intensified involvement of arts and science faculty in the process of revising, developing, and delivering program content and pedagogy, adhering to the maxim "that teacher preparation is the responsibility of an entire institution, not just the education department." Arts and science faculty were provided documents outlining the content that teachers are expected to master and the knowledge and concepts students are expected to learn. Education and arts and science faculty collaborated extensively to establish high standards for content preparation.

- Establishment of the Lena C. Bailey Educational Resource Center to house support materials and provide assistance with the development of instructional materials to all teacher education majors and area teachers. This new Center houses computers with Internet access, multimedia equipment, CD-ROM resources, and instructional materials and supplies. This Center houses many Booth materials and equipment.

- Development of the *Booth Teacher Training Initiative*. This comprehensive, innovative program prepares Pikeville College teacher education majors to integrate state-of-the-art technology with classroom instruction. The program employs a full-time technology integrationist to work with education majors as well as faculty in education and the arts and sciences. The new Booth Instructional Technology Center offers a network of new computers and multimedia instructional capabilities. Perhaps the most exciting aspect of this program is its laptop computer for seven day/twenty four hour use. Because the College is wireless, students can apply technology tools anywhere on campus, access online resources and communicate with fellow students and faculty. This exerting program also provides weeklong summer technology institutes for ninety (90) area teachers. Institutes are offered free of charge and a five hundred dollar ($500) stipend is provided each participant.

- Provision of technology-enhanced learning opportunities through the Booth Programs. Through Booth Program file servers educational enrichment programs and services will be provided to students, teachers, and Booth Scholars. Tutorials, CD-ROMS, streaming video, threaded discussion, and virtual course work will be among the services delivered through file servers on the Pikeville College campus

- Initiation of opportunities for education majors to mentor area students. Collaborative efforts between the education department, the Booth Teacher Training Initiative, and the Booth Scholars Program will allow education majors to establish mentoring relationships with youth from the region through the use of technology. This will be possible because both education majors and Scholars will be provided laptop computers, Internet access, and resources/services delivered through a program file server.

Pikeville College's Teacher Education Program is operated on the precept of a multicultural educational experience. Therefore, the Program faculty believe that each student can learn and learn at high level. The Program faculty promote and practice respect for cultural differences acknowledge students' micro-cultural experiences, place students at the center of the learning process, conduct critical analysis of oppression and discrimination, and critique society in the interest of social justice and equality.

The teacher training model (or conceptual framework) captures the essence of the program's mission: "Progressive Educators of the Whole Person: A Collaborative Approach." Through the implementation of this framework, the faculty seek to train teachers who will promote an experience-based, child-centered approach to education; who will teach cooperative learning, critical thinking and decision-making; who will view the classroom as democracy in practice; who will practice the components of continuous assessment, including formative evaluation and positive reinforcement; and who will facilitate, guide and supervise learning.

Progressive educators of the whole person recognize different ways of knowing and learning and stimulate multiple intelligences of students in maximizing learning opportunities. The Collaborative approach affirms the notion that we all, as parents, teachers, and members of the larger community must work together to prepare our students for the complexities and challenges of the twenty-first century.

Introducing Disciplinary Thinking Through the Development of an On-Line Tutorial

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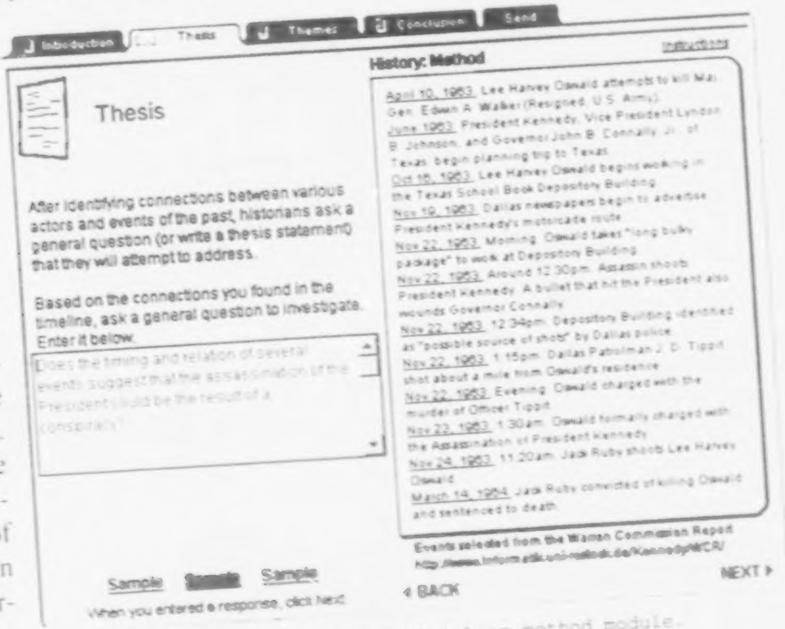
An instructor of an introductory level course faces a number of challenges. Obviously, there is a need to cover an increasing amount of information in a very limited amount of time. Coupled with this, students must be introduced to a new vocabulary set that is on par with a foreign language class. The topic that receives little if any attention but is probably of greater importance is an introduction to the way of thinking in the discipline. It is an understanding of the disciplinary approach, more than mastery of facts that is important in motivating students to continue studying in the discipline. Toward this end, a set of interactive computer tutorials was produced that allows students to acquire this needed perspective at their own pace. The foundation of the tutorials was a set of module templates from which all of the disciplinary exercises were developed. The project goal was based on a statement made by Charles K. West in his work, *Instructional Design: Implications from Cognitive Science*, "...learning best begins with a big picture, a schema, a holistic cognitive structure."

The development of what has come to be called "The Scholar's Way of Thinking" began with the simple goal of helping students to write better research papers or lab reports. The concrete implementation of this vision began with the exploration of the questions experts ask in given disciplines. The working premise was that with an introduction to underlying disciplinary questions, students would achieve a higher level of disciplinary reasoning and better writing. In the end, our goal was to conceive student historians or student biologists or student sociologists and at some point to give birth to disciplinary contributors. For this educational process to impact a large number of students with minimal time expenditure for instructors, the tutorials were developed for online distribution and interactivity.

In the process of considering the fundamental questions that underpin inquiry in any discipline, it became apparent that an initiation to the discipline required the prerequisite knowledge of what the discipline is. This disciplinary definition was a necessary foundation from which to work. While the complexity of a discipline can hardly be considered in a one or two sentence definition, students need a starting point from which to build their disciplinary research model. To illustrate with history, the definition has three components. First, history includes what happened in the past.

Second, on a more practical level for students of the present, history consists of the evidence of the past that people can study. Third, it is the story of the past that people write.

After developing a working disciplinary definition, important research questions of the discipline were considered. These questions, in turn, form the basis of the discipline's research method, i.e. the historical method, the scientific method, etc. Using history as a model again, historians begin with a broad knowledge of a topic by reading relevant books, articles, or manuscripts. They then develop a general question to investigate. The general question leads to more specific areas of investigation that the historian describes as either statements or further questions. After addressing the more detailed queries, the historian is ready to present a conclusion to the general question. With this introduction, a student is given a perspective to start working on a historical research project. Since the exposure to this foundation is fundamental, the first module in the Scholar's Way of Thinking and the first component of the template was "The Scholar's Method," introducing the student to the disciplinary process of research in a given field.



Thesis

After identifying connections between various actors and events of the past, historians ask a general question (or write a thesis statement) that they will attempt to address.

Based on the connections you found in the timeline, ask a general question to investigate. Enter it below.

Does the timing and relation of several events suggest that the assassination of the President could be the result of a conspiracy?

When you entered a response, click Next

History: Method

April 10, 1963. Lee Harvey Oswald attempts to kill Maj. Gen. Edwin A. Walker (Resigned, U.S. Army).
June 1963. President Kennedy, Vice President Lyndon B. Johnson, and Governor John B. Connally Jr., of Texas begin planning trip to Texas.
Oct 16, 1963. Lee Harvey Oswald begins working in the Texas School Book Depository Building
Nov 19, 1963. Dallas newspapers begin to advertise President Kennedy's motorcade route
Nov 22, 1963. Morning. Oswald takes "long bulky package" to work at Depository Building
Nov 22, 1963. Around 12:30pm. Assassin shoots President Kennedy. A bullet that hit the President also wounds Governor Connally
Nov 22, 1963. 12:34pm. Depository Building identified as "possible source of shots" by Dallas police
Nov 22, 1963. 1:15pm. Dallas Patrolman J. D. Tippit shot about a mile from Oswald's residence
Nov 22, 1963. Evening. Oswald charged with the murder of Officer Tippit
Nov 23, 1963. 1:30am. Oswald formally charged with the Assassination of President Kennedy
Nov 24, 1963. 11:20am. Jack Ruby shoots Lee Harvey Oswald
March 14, 1964. Jack Ruby convicted of killing Oswald and sentenced to death

Events selected from the Warren Commission Report
http://www.informatik.uni-rostock.de/Kennedy/WCR/

Figure 1. The Historian's Way of Thinking method module.

Once aware of the questions raised in the process of using a given discipline's method, students need to be shown how to identify and analyze these tools of the trade. For the historian, primary sources, first hand accounts such as letters, government documents, music, etc. are the basic research materials. While historians use multiple forms of quantitative and qualitative analysis, investigation of a source always includes an evaluation of the creator's perspective and the historical context in which the account was produced. This overview of the scholar's tools developed into the second module in the Scholar's Way of Thinking. The second module, "The Scholar's Tools," introduces students to the analysis and materials scholars use to do research.

It became apparent that to write a good paper or laboratory report one more step was required in addition to learning the process of asking introductory questions and learning to analyze evidence. Students must be able to present their conclusions in a logical, cohesive manner. For history, the book review is a model. A book review gives an overview of the thesis, themes, and conclusion of a historical work. In addition, reviewers point out any bias or shortcomings in the selected materials or the analysis. The evaluation also includes references to the author's argument and logic, whether reasonable or flawed. This process was intended to provide students with the skill to do a critique of their own work. If students understand the structures used in a book review and can apply them

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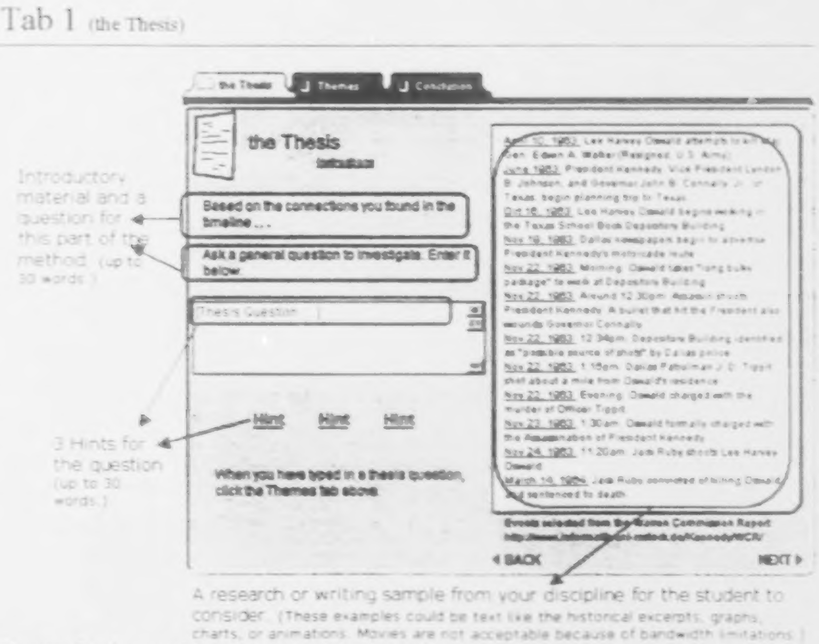
to their own writing, then they can write better papers. The review of disciplinary writing formed the basis for the third module in the Scholar's Way of Thinking. The third component of the tutorial, "The Scholar's Discussion" introduced the student to the way scholars actively read and evaluate materials in their discipline.

As the history modules developed, so did the template. It seemed that the three major divisions -- research methods, tools, and writing – could apply to all disciplines. A brief overview of many disciplines revealed a well-developed set of research methodologies, a preference for certain types of data, and often very specific details concerning how to write a research report. Introductions to methodology and writing were often found in textbooks or on personal web sites. The goal for "The Scholar's Way of Thinking" template was to take the next step and engage the students – to allow the student to *do* history or biology rather than read about it.

In order to present a discipline's research methods, tools or writing, the authors had to transform abstract descriptions into a concrete process. The template consisted of up to five distinct sections or pages, corresponding to disciplinary processes of four or five steps. Tabs at the top of each page held the section titles and served as navigation buttons. Each page included two columns. The left column contained an introduction to an important concept and space for questions, answers, and hints. The right column contained research material that students would analyze. The hints did not give the answer but were general points to remember about disciplinary thinking. See Figure 2 below to view an example of the template.

The biology tutorial illustrates how applicable this format is for any discipline. It demonstrates that this architecture is sufficiently flexible to handle requirements in Biology without necessitating changes of such magnitude that a student could not move easily between different disciplines' modules. For Biology, like in History, it was necessary to articulate a disciplinary definition and description. The science of biology is the study of living things. What this really means is researchers are constantly investigating the mechanisms that permit organisms to function. This is true regardless of whether one is studying how insulin triggers an increase in blood sugar at the cellular level or how salmon find their way back to the stream in which they were born. But researchers are not just interested in understanding functional mechanisms. They are also interested in discovering the factors that influenced the evolution for


Tab 1 (the Thesis)

Based on the connections you found in the timeline . . .

Ask a general question to investigate. Enter it below.

When you have typed in a thesis question, click the Themes tab above.

April 10, 1963: Lee Harvey Oswald attempts to kill Maj. Gen. Edwin A. Walker (Resigned, U.S. Army)
June 1963: President Kennedy, Vice President Lyndon B. Johnson, and Governor John B. Connally, Jr. of Texas, begin planning trip to Texas.
Oct 16, 1963: Lee Harvey Oswald begins working in the Texas School Book Depository Building
Nov 19, 1963: Dallas newspapers begin to advertise President Kennedy's motorcade route
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Nov 22, 1963: Around 12:30pm: Assassin shoots President Kennedy. A bullet that hit the President also wounds Governor Connally
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Nov 22, 1963: Evening: Oswald charged with the murder of Officer Tippit
Nov 23, 1963: 1:30am: Oswald formally charged with the Assassination of President Kennedy
Nov 24, 1963: 11:20am: Jack Ruby shoots Lee Harvey Oswald
March 14, 1964: Jack Ruby convicted of killing Oswald and sentenced to death

Events selected from the Warren Commission Report
[illegible]

Introductory material and a question for this part of the method. (up to 30 words.)

3 Hints for the question (up to 30 words.)

A research or writing sample from your discipline for the student to consider. (These examples could be text like the historical excerpts, graphs, charts, or animations. Movies are not acceptable because of bandwidth limitations.)

Figure 2. A sample page from the template.

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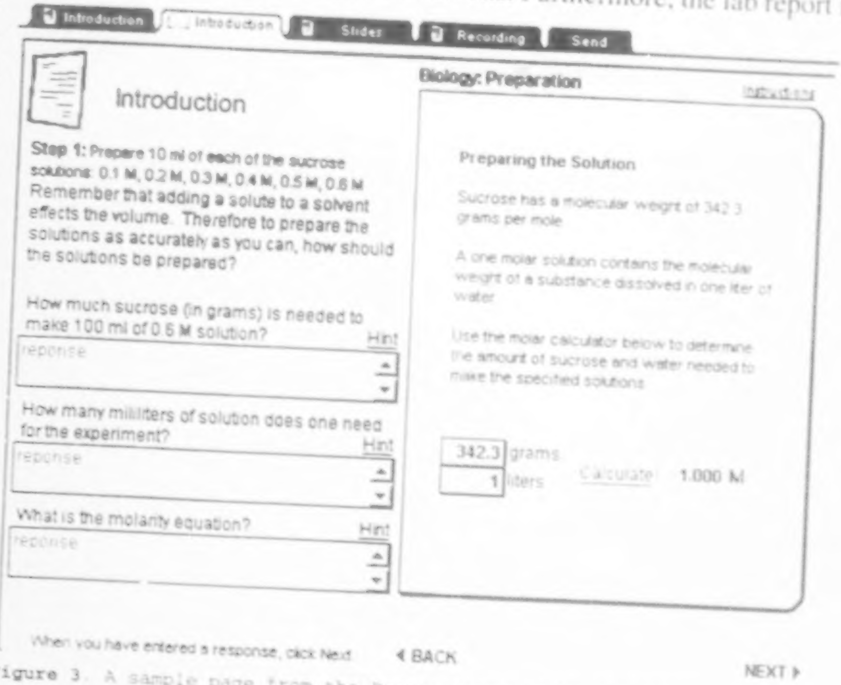
the mechanism in question. So they also ask broader questions like, "Why is sickle cell amenia a disease that persists in Africa?"

Since biology presents a viewpoint of the world based on a set of facts, acquisition of these facts – data – is essential. Data is obtained through a process called the scientific method. There are four phases to this methodology. Phase one is observation. A researcher becomes aware of some phenomenon, such as an environmentally triggered response, and wonders, "How is this phenomenon accomplished?" Phase two is the generation of a hypothesis. A hypothesis pertains to observations in phase one and is posed in such a way that its validity can be tested. The formulation of a hypothesis begins with an educated guess about the factor(s) that produced the observed phenomenon. It is through the identification of these factor(s) that tests can be designed. Phase three is experimentation. Through the execution of carefully designed experiments, data acquisition occurs and hypotheses are tested. Phase four is the conclusion. Conclusions, based on the interpretation of the data, validate or invalidate the original hypothesis. It is this continual testing of hypotheses pertaining to living systems that distinguishes a biologist from other scientists. The scientific method forms the basis of "The Scholar's Method," and living systems and data acquisition were of fundamental importance as "The Scholar's Tools" in Biology.

A well-written lab report is a vital part of a successful experiment. By constructing such a document, the researcher is forced – one more time – to assess her conclusions. Furthermore, the lab report is the device that will be used by the researcher or a colleague to extend the knowledge base in the area. For the report to be of use, it must contain all of the information that the researcher possessed as the experiment occurred. This information includes the preparation steps, regardless of how minute they might seem; all raw data, presented in a clear and concise manner with accurate labels and appropriate units; and clearly stated conclusions with supportive information. Reference to information previously available in scholarly literature should also be cited to enable the reader to judge the experiment in light of the knowledge of the particular field. Lastly, the report should be free of grammatical and spelling errors. The lab report formed the bases of "The Scholar's Discussion" in Biology.



Introduction

Step 1: Prepare 10 ml of each of the sucrose solutions: 0.1 M, 0.2 M, 0.3 M, 0.4 M, 0.5 M, 0.6 M. Remember that adding a solute to a solvent effects the volume. Therefore to prepare the solutions as accurately as you can, how should the solutions be prepared?

How much sucrose (in grams) is needed to make 100 ml of 0.6 M solution?
reponse

How many milliliters of solution does one need for the experiment?
reponse

What is the molarity equation?
reponse

When you have entered a response, click Next

Biology: Preparation

Preparing the Solution

Sucrose has a molecular weight of 342.3 grams per mole

A one molar solution contains the molecular weight of a substance dissolved in one liter of water

Use the molar calculator below to determine the amount of sucrose and water needed to make the specified solutions

342.3 grams
1 liters
1.000 M

Figure 3. A sample page from the Preparation module in Biology.

The structural layout of the three modules facilitated the development of instructional materials as well as the processing of the materials by students. The question-answer format was fairly easy to adapt to the needs of disciplinary authors. Some authors required more than text boxes for input. Drag and drop features in the Physics module allowed for new ways of analyzing word problems. In Philosophy, mouseovers highlighted sentences and pop-up windows included instructor commentary making textual analysis more immediate. Students noted the consistent format and the combination of navigational features and keywords in the tabs across the top of the module windows. Since intuition is really prior experience that one takes for granted, the consistency of the graphic design and interactive practices used in the modules allowed students to focus on content rather than where to click. In all cases of special interactivity, specific directions were provided.

The contributors to "The Scholar's Way of Thinking," including the authors to this paper, experienced the painstaking iterative process as well as the intellectual rewards involved in producing the tutorials. The first major hurdle that the scholars had to overcome was the complexity of their disciplines. The fundamental topics available for an introductory study in any discipline were vast. Deciding where to impose limits on a discipline in order to write a simple definition or a single methodology was also very difficult. The explanation of the template itself – including descriptions of the method, tools, and discussion sections – required many pages of text and graphics as well as discussions via email and phone. The construction of each template was an iterative process as the authors attempted to reduce complexity to the manageable form of the template. Upon completion of the project several scholars mentioned that the reflective process actually improved their teaching. They mentioned that their research methods and teaching were so instinctive and effective that they seldom had to reconsider the "how." One professor commented, "Quite enjoyed this challenging exercise. It reminded me once more of how little time and effort professors spend thinking about teaching." Time to "think about teaching" – the focus on communicating methodology as well as information – was the greatest reward of "The Scholar's Way of Thinking" project.

Technology in the Classroom, I'm Scared
"A Professor's Journey"

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ABSTRACT

How many gigabytes do you have? Do you have a zip drive? How much RAM does your computer have? Do you have course materials on the web? What is your sign? The last question is the only question that I know the answer to, or for that matter, understand. I went to college in the early 80's when we were still programming in Basic. And word processing, what was that? I used a typewriter, one that had built in correction – very advanced. My students and children know more about computers than I do. I use Microsoft Office, Excel, e-mail, and the Web. However, since I only know the bare minimum about computer technology, I don't use them to their fullest capability.

So what does any of this have to do with the ASCUE conference? I am making a concerted effort during the spring semester 2001 to become educated on my computer and to be able to use this technology in the classroom. An associate professor from the computer information systems technology department has agreed to become my teacher/mentor. With his help, I am going to put one of my spring 2001 courses on the Web. This will include the syllabus, case studies and the class schedule. I am going to test this project with my fall 2001 class and make improvements based on feedback. My future plans are to put all of my courses on the Web.

This paper/presentation will focus on my journey from being basically computer illiterate to becoming a professor that uses technology in the classroom.

INTRODUCTION

I have to say, getting started was a struggle. I was afraid of the challenge of tackling new technology. If it weren't for my teacher/mentor, I would still be sitting at my computer staring at the computer screen wondering how to get started, and rethinking this entire project.

I first asked myself why I wanted to take on this endeavor. First, I felt out of sync, being an associate professor in the school of technology, yet using very little. Second, I knew that using technology could make my job easier and more cost efficient. I would be able to post lecture notes, grades, case studies, links to course related site, etc. Third, I knew it would be more convenient for my students. Since our campus is a commuter campus, with a majority of the students being full-time professionals, it would make it easier for the students to access course information, in the advent that their job required them to miss class due to traveling or work related issues.

GETTING STARTED

Since I decided that using the web was a good idea, based on the reasons stated above, OLS 376 Human Resource Issues was the class that I chose to put on the web first. Since this is a class that I teach every semester, it made sense for this to be the pilot. Also, this class generates a lot of paper. Each semester, I pass out a syllabus and eight case studies. The case studies are approximately 2-3 pages in length, with 30-35 students each semester. I figured there was a more cost efficient way to offer this class.

USING THE TECHNOLOGY

There are many ways to develop web pages. Since I have current knowledge in using Microsoft Word and Windows, this was the technology that I used. I contacted the local Network Administrator and he set up an area on the university web server. This is the location that I put my web page.

First I used Microsoft Word to type my syllabus and case studies. I saved these as a word document and then as a web document. I then created a file folder in the web called OLS 376 and saved all my web documents (syllabus and 8 separate case studies) to that file folder. I used my teacher/mentor's web page as a template and added my information. (Figures 1 & 2) The web page was created in Front Page.

I still plan on passing out a syllabus the first day of class but not the cases. On the syllabus will be the location of my Web page. The students will also be able to access this Web page by accessing my instructor profile on the IUPUC (Indiana University, Purdue University Columbus) Web page.

WHAT I LEARNED

I have learned that I do not know very much about all this new technology. I have become obsolete in this techno-world. As my teacher/mentor was helping me with my web page I was afraid to touch the mouse or keys on the computer, from fear of messing up the web page or losing all the work that I had completed. I was truly in the teacher/student relationship, trying to absorb all the information that I could. While he was sitting with me, coaching me, I did fine. Later when I tried to remember what he had told me, and tried to decipher my notes, I felt lost. I really am an eager learner, and I have the mental capability to get this, however, I think I have turned into a techno-phobic, something I don't want to be.

FUTURE PLANS

Now that I am finished whining, I will describe my future plans. I plan on signing up for computer courses through the continuing education department during the fall 2001 and spring 2002 semesters. I plan to continue to work with my teacher/mentor to further improve my skills. I plan to test the course web page with my fall 2001 class and make changes based on my students input. I plan on putting all of the courses that I teach on the web. I plan to add grades, lecture notes, links to technical sites, and publish, to all my courses web pages. Lastly, I plan to continuously improve my computer skills.

STAKEHOLDER IMPACT ON THE IT CURRICULUM

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ABSTRACT

Faculty responsible for maintaining Information Technology (IT) curricula in higher education are faced with the never-ending task of assessing and modifying curricular offerings. More so than other disciplines, various stakeholders, both external and internal, influence the IT curriculum. These stakeholders range from computer and software manufacturers to prospective employers on the external side and from resource providers to faculty on the internal side.

This paper will identify the range of stakeholders who influence IT curricula and discuss their impact on our programs. The paper will also suggest ways to solicit meaningful feedback and advice from the identified stakeholders. Finally, the paper will discuss how information gathered should then be incorporated as we analyze, modify and maintain a state of quality and currency within our curricula.

INTRODUCTION

Depending on our institutional history, we are likely to refer to our computer and systems-related academic programs as Computer Science, Computer Information Systems, Information Systems Management, Management Information Systems, or Information Technology. In this paper, the term Information Technology (IT) will be used as the generic reference to computer and systems-related educational programs. Some programs may have a technical focus while others may have a more systems-related emphasis. Although each program may have a slightly different content emphasis, prevailing concerns common to all programs include the need to change and the need to maintain a state of relevant currency in what we deliver to our students. More so than nearly any other discipline, today's Information Technology curriculum in higher education is subject to the rapidly evolving climate of change that prevails in today's technology-driven world. As early as 1965, G. E. Moore, one of the founders of Intel Corporation, suggested that the power of an integrated circuit would double every year while the cost remained constant (Moore, 1965). Moore (1995) later revised his estimate to a doubling of computing power every 18 months. This theory came to be known as Moore's Law. Moore (1997) then applied the law to the Web, electronic commerce and supply chain management. If we accept Moore's Law as at least partially credible, it serves to substantiate the notion that rapid technological change and technological developments can have a significant impact on our educational programs. This rapid rate of technological change adds pressure to our role as educators and indeed does have curricular implications. As educators, the author contends that we must concede that part of our role is to monitor developments and revise educational programs as appropriate and economically feasible.

Of course, there are some who will contend that we should not teach technology; we should teach people to think and to problem-solve. There is much merit to this reasoning; however, the tools that we use for teaching need to be relevant. Obsolescent tools will lead to obsolescence in what we deliver, and will not serve either our students or our external stakeholders well. Obviously, we all want to build a solid foundation that lends itself to further learning. The question, then, is how do we maintain a respectable and relevant state of currency?

CURRICULUM CURRENCY

Curriculum evaluation and alteration can be a controversial subject. Many faculty strongly maintain that curriculum design and delivery is the sole responsibility of the faculty. Outside input is not needed (Pearce, 1999). This attitude is easily supported so long as it is not done in a vacuum. A close-minded approach and resistance to change will doom today's IT programs, as well as many of our other programs, to failure and obsolescence. Our responsibility in Information Technology is quite different from that of our colleagues teaching in disciplines not subject to modern day changes or developments. Our discipline is rapidly changing and evolving as we speak. As educators, the author contends that we must react to change. This statement should not be interpreted as advocating the teaching of technology or adopting a "trade school" approach. Instead, the author is an advocate of being aware of developments, being receptive to change and reacting on a timely basis and within financial means.

Two major dilemmas serve as sources of frustration for many who are responsible for the design and delivery of technology-related academic programs. The first dilemma that the academic community frequently faces is a lack of exposure to the rapid changes and developments in the communities that we serve – today's organizations and businesses. When we are busy teaching our classes and tending to our everyday regimens, the technology world continues to advance. Can we or should we attempt to correlate our educational delivery with the needs of the communities we serve? Should we develop a spirit of dialogue and cooperation with our communities? The author contends that it is important not only to identify our stakeholders, but also to partner with them and understand their needs. The second dilemma, of course, is the availability of financial resources. It is relatively safe to say that everyone who uses technology would do a number of things differently if additional financial support was available. Most of our institutions cannot provide funds for every state of the art tool available, and therefore we must be innovative and effective in using what we have. Frequently, with technology education, there is an expressed desire and willingness to forge ahead and be innovative, but financial resources to support progressive initiatives are simply not available.

The effective implementation of technology in our programs is not limited to programs in Information Technology. Although this paper has focused on the IT curriculum and the many dynamics that can affect it, meaningful integration of IT into the overall curriculum with the goal of providing all students with the requisite skills to make an impact is also of paramount importance. The primary goal for many of us is getting both faculty and students to be as information technology aware as their organizational counterparts (Faculty, Money,...., 2000).

This paper will not venture into an exercise on how to identify key stakeholders. That is always an introspective exercise to be carried out by the faculty of a given program. This paper will focus on several key stakeholders that, in the view of the author, can make a difference. Included among the stakeholders will be the faculty, professional advisory boards, internship providers, and employers of our graduates. This paper will also present general areas of content coverage in today's IT curriculum. Simply put, what does it take to maintain a state of currency with our educational offerings? Perhaps more importantly, how should we alter our curricular offerings to best serve our student population?

FACULTY AND CURRICULUM

Faculty responsible for the delivery of academic programs in IT, in addition to the normal required teaching, research and service activities, can add significant value by participating in the following additional activities: (Davis, 1997)

- Technology assessment for maintaining currency of hardware and software;
- Serving as a computing resource for other faculty;
- Developing partnerships with hardware and software suppliers;
- High-level participation in academic and professional societies; and
- Willingness and readiness to constantly retool.

Familiarity with the curriculum recommendations of the academic professional subcommittees of professional organizations is also important. Although growing somewhat obsolete, the IS'97 Model Curriculum and Guidelines for Undergraduate Degree Programs in Information Systems can serve as a very useful and valuable resource. The model curriculum, a joint effort of subcommittees from the Association for Computing Machinery (ACM), the Association for Information Systems (AIS), and the Association of Information Technology Professionals (AITP) provides valuable guidelines for general topical coverage (Davis, 1997).

The Model Curriculum advocates that IT, as an academic discipline, should encompass two broad areas, namely the information systems function and the system development function. Within the former, acquisition, deployment and management of information technology and services are included, while the latter includes the development and evolution of technology infrastructures and systems for use in organization processes (Ibid.). Further decomposition of the curriculum architecture reveals five curriculum presentation areas. Included are information systems fundamentals, information systems theory and practice, information technology, information systems development, and information systems deployment and management processes. The curriculum presentation areas are further subdivided into ten courses that are depicted in the following chart (Ibid.):

Levels	Presentation Areas	Courses
1 General	IS Fundamentals	Fundamentals of IS Personal Productivity with IS Technology
	Information Systems Theory And Practice	Information Systems Theory and Practice

2 Major and Minor	Information Technology	Information Technology Hardware and Software Programming, Data, File, and Object Structures Networks and Telecommunications
		Analysis and Logical Design
3 Major	Information Systems Development	Physical Design and Implementation with a DBMS Physical Design and Implementation with a Programming Environment
	Information System Deployment And Management Processes	Project Management and Practice

The Model Curriculum also provides course descriptions and resource recommendations for a degree program. Appendices provide the basis for customizing courses while maintaining the basics proposed by the curriculum. The means for ongoing curriculum adaptations and updates is also included (Ibid.).

Of course, there are other model curricula that educators can access and examine. The model presented above, although popular, is shown as an example rather than an exclusive, one of a kind publication. The primary problem with heavy reliance on a model curriculum is that the particulars of the model may be obsolete before the finished work is published and distributed. However, the model presented above presents an architecture and a conceptual framework that allows for significant adaptations and changes.

Other faculty issues to consider include an honest assessment of areas of faculty strengths and deficiencies. There are times that program design and offerings will be dictated by the abilities of the faculty to deliver. Closely related to this issue is the willingness of the faculty to retool and accept new challenges. New developments frequently dictate a need for formal training and course pilots and refinements. That willingness to continue with lifelong learning, referred to earlier in this paper, becomes increasingly important, as the technology world continues to evolve and change

In some cases, where strong partnerships exist between higher education and community businesses and organizations, faculty externship opportunities have been developed. This is usually a "win-win" situation in that the faculty member is the recipient of a valuable work-related learning experience, and the organization receives the benefits of having a bright, mature and dedicated individual for little or nominal compensation. Faculty who participate in such programs are then able to apply the first-hand experience gained in their classroom settings.

One final idea for faculty is to develop a sense of awareness through best practice benchmarking. It is always helpful to know what the best programs are doing and certainly what one's closest competitors are doing. Developing familiarity with the successful practices of others frequently generates ideas for improvement and results in positive changes.

EXTERNAL STAKEHOLDER IMPACT

Advisory board members can play a very significant role in influencing the programs of study of the schools they serve. They are in an excellent position to provide constant feedback on the product the schools turn out, namely the graduates who are expected to be immediately productive as they venture into the "real world." "The business world has never been more competitive and volatile than it is today. And it has never moved so fast." Business schools readily admit that they are unable to keep pace without valuable direct links to the business world ("Business Schools....," Newsline, Summer 2000). Business educators frequently seek valuable input from executives in the form of knowledge and skills desirable in graduates (Pearce, 1999).

School / advisory board partnerships are mutually beneficial. Board members have an opportunity to recruit top graduates, and they are relatively familiar with the content of the educational program in question. Being in a position to influence the content of the educational program being served also motivates active participation in the process ("Business Schools....," Newsline). However, in recent years, the attitude of advisory board members has changed. They used to be content to listen, but now they want to be involved and have an impact. They want to focus on projects, make meaningful recommendations, and follow-up on their recommendations. They are high-level people willing to give their time, but they are also very results-oriented. Because of their many commitments, the time of these board members must be respected. Meetings must be kept very crisp and focused, starting and ending on time (Ibid.).

Board members, in addition to being sounding boards, financial supporters, friends, public relations agents, employers, internship sources, and faculty research site providers have become working partners with administration, faculty, and students. Some serve as adjunct faculty offering their experience and expertise with students in a classroom setting. Others assist faculty in course delivery, serving as guest speakers or delivering live case studies and simulating work experiences (Gilbreath, 2001). Typically, their classroom behavior will be different than that of faculty, usually acting more like managers. They tend not to mince words when students do not perform well and are sometimes perceived as less tolerant of excuses (Ibid.).

It has been demonstrated that advisory boards can become a very valuable information source. Their value increases as they become increasingly familiar with the School's programs and students. Pearce (1999), optimistically reports in The Academy of Management Executive that executives and educators are developing genuine collaboration. Genuine efforts are being made by advisory board members to better understand the inner workings of a collegiate environment while faculty and school administrators learn more about the needs and current experience of the communities they serve. There is a general sense that any effort to increase the quantity and quality of dialogue between faculty and executives is beneficial to both parties.

Despite all the optimism, enthusiasm, and cooperation, six core issues have been identified as somewhat contentious. They include: (Ibid.)

1. Technology-assisted pedagogy pertains to the reluctance of faculty to embrace new technology-rich teaching technologies to the extent that student skills exceed professor skills.

2. The faculty tenure issue centers on decreased flexibility and, at times, incompetence.

3. Globalization refers to the development of student understanding of diverse cultures and obtaining information (usually through technology) for the development of effective strategies.

4. Linkages to business practice pertain to meaningful references to business practice through examples, analogies and metaphors. Collaborative research is encouraged as the best remedy.

5. Academic research is challenged as not being pertinent to improved organizational practices.

6. Institutional competition for tuition dollars refers to the entrant of new non-traditional educational suppliers to the marketplace.

Several of the points identified above have significant implications for the IT curriculum as well as technology-related pedagogy and education as it pertains to the entire curriculum. Three points in particular are relevant to IT and to developing the notion that continuous improvement and receptiveness to change are competitive issues. First, current and relevant technology is very important, not only to those majoring in our IT programs, but also to our general student population. Second, the effective use of available technology can improve our teaching. It can enable us to provide convenient information sources that, in the past, simply were not readily available. Third, if we refuse to change and adapt to the needs of our stakeholders, there are many for profit institutions that will customize educational programs and will play the role of new entrants to the educational marketplace. Thus, we too, are faced with the ever-increasing threat of global competition. The philosophy of the for-profit schools that offer associate, bachelor's, and master's degrees is that they learn what the employers need, design programs to meet the needs and then run their school like a business (Hodges, 1999).

CONCLUSION

A number of issues have been introduced into the mix of considerations that are important in the IT curriculum assessment and revision process. Employers and graduates have expressed a desire to experience coursework and be exposed to skills that bridge the gap between theory and practice (Mirabella, 1999). An expressed willingness on the part of employers and schools to collaborate and cooperate has become commonplace (Pearce). Key success ingredients include faculty who are receptive to change, ongoing external stakeholder participation, and effective communication and delivery. Desirable faculty attributes include a desire for lifelong learning, knowledge of the outside world, a willingness to consider and manage change, and the ability to retool and adapt. Information gathering and synthesis must be an ongoing process, and it must manifest itself in the form of curriculum modifications and changes. External stakeholders must understand what is important to those in higher education and the implications of resource constraints, be willing to assist with the change process, and be proactive in helping the institutions with whom they are affiliated. In the Information Technology field, change is truly a constant that we cannot escape.

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Individual & Collaborative Calendaring Using CorporateTime

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Is scheduling a simple one-hour meeting with three staff members from different departments a telephone tag nightmare for you? Looking for a simple electronic calendar that can also sync with palm devices and hand-held PCs? Want to be able to access your office calendar from anywhere via the web? Come see how CorporateTime, the calendaring system from Corporate Software & Technologies International, has solved these problems at Roanoke College.

With CorporateTime you can easily:

Create meetings and invite others to them
Create tasks (and assign them to someone else!)
Print your calendar in a variety of formats
Easily find a mutually available meeting time for a group
Access your calendar via the web
Sync with hand-held devices

If you would like to see this calendaring software in action, then this presentation is for you. I will demonstrate the software's features and will outline its implementation and support at Roanoke College.

(This paper was not available at the time the Proceedings went to press. The author will supply copies of the papers at his talk or provide a url if it is posted on the web.)

Creating a Multicultural Context Using Technology

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Introduction

An idyllic campus of ivy covered brick buildings nestled around a tree-line mall in the center of a small mid-western town, what a wonderful place to study and learn. Until you realize that of the 1020 students on campus, 957 come from Indiana, 975 are Caucasian, 705 are Christian. The surrounding county has a population that is 97% Caucasian. And you want to teach students how to lead in a multicultural context!

This is not an unusual challenge, especially for small liberal arts schools. Often these schools are tucked away in small rural towns and it is difficult for them to recreate the diversity that students will encounter once they enter the globally connected work world. Yet there is no question that colleges must address the problem.

In his book Global Literacy, Robert Rosen interviewed one hundred leaders of major corporations in 17 countries. When asked what factors would predict success for a company in the twenty-first century, the top two responses were (1) developing leaders and (2) competence in multicultural settings. How then can colleges best allocate scarce resources to help students develop skills for working with people whose basic assumptions about life differ markedly from the students' own?

It is not enough to simply offer food from different cultures in the dining hall or to hold an international fair on campus. But what is enough? Must colleges provide a semester of study abroad for every student? Should colleges with relatively homogenous student populations invest hundreds of thousands of dollars in diversity scholarships to create multicultural learning communities on their campuses? Is a well-structured, well-researched curriculum sufficient? Or is it possible that modern technology can provide a more cost-effective solution? These questions complicated the already difficult job of developing the curriculum for a new course, "Leadership in a Multicultural Context," to be offered at Franklin College.

Course Development

A grant from the Ball Brothers Foundation Venture Fund (???) enabled the Leadership Program at Franklin college to bring together, in June 2000, nine scholars from different cultural backgrounds. These scholars shared knowledge of their own cultures' expectations of leaders and also served as a mini-case study in working together across cultural differences. The scholars involved were

Allen Berger, then-Dean of Franklin College
Oystein Dalland, Telemark University, Norway
Yeong-kuang Ger, National Taiwan University, Taiwan
Alexander Karpenko, University of St. Petersburg, Russia
Darryl Peterkin, Dillard College, Louisiana
Bonnie Pribush, Franklin College
Ginger Seubert, Franklin College
Victor Vallee, California State Polytechnic University, California
Charles White Buffalo, Ogalala Lakota College, South Dakota

After two weeks together, the content of the course "Leadership in a Multicultural Context" was outlined and key skills necessary for leading in a multicultural context were identified. The course would begin with a study of frameworks for understanding cultural differences (Hofstede, Trompenaurs) and for understanding the important dynamics of leadership. Time would then be spent introducing experientially the skills identified (Listening for the Intended Purpose; Taking Another's Perspective; …). Then, to encourage students to apply these ideas they would be required to research in depth one culture different from their own. Finally, a simulation needed to be developed where students could practice their skills and have some experience of immersion in a different culture.

The content was solid but the actual experiences that would provide insights and opportunities for new behaviors were still lacking. Although there are cultural simulations such as Bafa Bafa and Barnega, students are often not fully invested in "play-acting" these situations. Even in their research, students would be accessing only books and articles without experiencing the reality of people whose basic assumptions differed from their own.

Since the current director of the Leadership Program was formerly a professor of computer science, she naturally looked to technology for innovative answers and she also naturally turned the college's Associate Dean and Institutional Researcher, who actively uses technology in his teaching and research. The result was a grant from Ameritech to use e-mail, video-conferencing and virtual world software to enhance the planned course.

Using Technology to Connect to Other Cultures

Having the wonderful resource of six professors from different culture backgrounds who had an interest and an investment in this course, was a resource too rich to waste. Enrollment in the class was limited to sixteen students. During the first week of class, they were asked to self-organize in groups of four around four of the six cultures (Hispanic, African-American, Native American, Russian, Norwegian, and Taiwanese). The latter four were the ones chosen.

The four professors from these cultures in the planning group were contacted and asked to serve as resource people. Two enthusiastically agreed, a third having left his university suggested a colleague who was also a friend of the Leadership Program Director, and the fourth agreed to limited participation. The following four professors were then "resource people" for the project groups researching leadership in their cultures:

Sigrid Bo : Norwegian Culture
Yeong-kuang Ger and Yu-Long Ling : Taiwanese Culture
Alexander Karpenko : Russian Culture
Charles White Buffalo : Native American Culture

In exchange for a stipend funded through the Ameritech grant, these professors agreed to respond to e-mail questions from the students and to be available for two video-conferences, the first with only the four-person research team and the second with the entire class of sixteen students. Students were encouraged to practice the skills taught in class and also to be particularly attentive to the behaviors and attitudes of their resource people as well as the information that they provided. The goal was for students to actually see how the cultural assumptions played out in normal interactions.

There were several technological challenges which were not anticipated. The first technological challenge was getting all of the equipment to work. There are two types of equipment being used. The "resource people" were all sent consumer type cameras that connect to a personal computer. These cameras cost roughly $100. The cameras were connected to a personal computer at the resource person's end. In order to conference with other people, Microsoft's NetMeeting was used. This was software that was readily available, as it comes with Windows 98 and Windows 2000, as well as on the installation CD for the cameras. The installation of the software and camera was another problem. Several of the "resource people" were familiar with computers or had access to help, while others did not. Helping those "resource people" became somewhat hard, because they sometimes only had one phone line, and it was in use for the internet connection for the camera.

The intent was to videoconference between these cameras and a video conferencing unit at Franklin College. The videoconferencing unit at Franklin is a VTEL ESA (Enterprise Series) model, which uses the ATM protocol over a T1 line. This unit cost around $15,000. The T1 for the videoconferencing unit is dedicated for just that use, so there are little to no worries about network traffic interfering with the video stream. When the VTEL unit was used with other professional level videoconferencing units, it worked very well. The picture and audio were of a very high quality, with very few "video artifacts" or jumps in the picture. When the PC based cameras were used, however, there were many problems. The picture would be very pixilated, the motion would freeze, and sometimes not show at all. These problems were due to several underlying factors. First, the resource people were using the cameras attached to regular PCs, which then used the IP protocol to connect to the VTEL equipment. This presented a problem, because the conversion from IP to ATM doesn't always work well. Further compounding this problem was the fact that the data lines being used weren't always at a high speed. Several of the resource people were connecting over a modem, which limited the capabilities due to the low line speed.

There were several things done to get around these problems. For one of the videoconferences, the "resource person" had access to a Tandberg 6000 professional video unit that gives the same or better video quality as the VTEL equipment. Problems arose during testing, however. There is a 6 hour time difference between Franklin College and Telemark University in Norway. This increased to a 7 hour difference once Norway changed time for the summer. This made finding a good test time difficult. Whenever a call would be made to Telemark from Franklin, the equipment worked well. However, whenever a call was made from Telemark to Franklin, the equipment wouldn't connect, and the call would be dropped after it started to connect. When a call was made from Norway into a bridge at IHETS (data and video service providers for Franklin College), the connection would work. When the two video units finally connected, the picture and the voice were of excellent quality. It was decided that Franklin would call Telemark when the time for the conference came near, so that a connection would be able to be made.

Another way these problems were overcome was by using a consumer camera and PC at each end. A PC with a camera was set up at Franklin College's end, with a video projector so the whole class would be able to see the image. A connection was made to the "resource person" at the other end. This method worked, to a certain extent. The picture did freeze several times, but would come back after a short period of time. The picture was of a decent quality, although nothing like what was possible with the VTEL equipment. For some of the conferences, a video connection wasn't possible, so a speakerphone was used for an audio conference.

This has been an incredible learning experience for the professors and technical support people as well as for the students. The depth of knowledge brought by the resource people could not have been easily replicated and the interest and enthusiasm among the students who were given the responsibility for establishing these connections had a positive impact on their learning.

Using Virtual Worlds for Simulation

A major concern about classroom simulations is the ability of students to genuinely enter into the experience. By using virtual worlds, the hope was that students would more easily take on different persona and play roles without inhibitions or distractions. We chose the Active Worlds Educational Universe (AWEDU) as our virtual reality platform. AWEDU uses Active Worlds technology to host three-dimensionally rendered online, multi-participant, synchronous, virtual reality environments for qualifying educational institutions. Our AWEDU world (known as "Virtual Franklin") enabled students to engage in a variety of online activities with some of the more salient features listed below:

- ☐ 3D graphical representations (commonly referred to as "avatars") of each student in a shared virtual environment
- ☐ Text-based synchronous chat with the capability to log chats
- ☐ Telegrams and file transfers to other online class members
- ☐ Integrated web browser
- ☐ Drag and drop editor for building objects
- ☐ Capacity for 20 simultaneous users

After an introduction to the basic functions in the virtual world, students were placed in groups and asked to "build" a world that would reflect a specific set of cultural assumptions that they were given. The creativity of the class was amazing. Once the world was designed and built, each group of four students took the rest of the class on a tour of their world. Through their behaviors and interactions, they also modeled their cultural assumptions. After each tour, the "tourists" in the world were asked to identify as many characteristics of the culture as they could. This exercise required the students to understand the practice as well as the theory of leadership in different cultures.

The final exercise, which was planned, was to create a groups with one student from each of the cultures in the virtual world and then provide them with a problem to jointly solve. The challenge here would be to stay in character and yet practice the behaviors that facilitate multicultural group problem solving. Unfortunately, it turned out that the plans for the class were much too ambitious. As often happens, the time required to familiarize sixteen students with the virtual world software was underestimated by about half. Also, because of the major research project that all students were engaged in as well as the day to day reflection papers required, much of the work in the virtual world occurred in class. Consequently, the time allocated to this segment of the course was used up before all of the planned assignments could be made.

Nonetheless, the use of the virtual world added a very positive experience for the students. They enjoyed the opportunity to be creative. They enjoyed the novelty. And after using the virtual world, the class was asked to look back on the experience as an example of cultural immersion. There are fascinating analogies between adapting to a virtual world and moving to a different culture. Modes of communication differ. Logical assumptions of how to do things (build, move across water) are disrupted by the practices of this world. Students were asked to reflect on how well they responded to these challenges. Were they in fact open to learning? Did they adapt and adjust or did they complain about the world and ask to have features changed? Did they take the opportunity to visit other worlds in the universe and learn the customs? This "meta-level" of experience required students to fully explore the analogies with cultural immersion and consider their responses.

Conclusion

As of the writing of this paper, the course is only half over. Most of the video-conferences have not yet occurred and the summative evaluation of how successful this experience was remains to be conducted. Reports on this must await the actual conference presentation. However, the experiment has been sufficiently successful and enough things have been learned, that the Leadership Program Director has committed to teaching the course again during the January intensive class and she will continue to use the technological enhancements with modifications suggested by this experience.

Storage Area Network: A case study of the design and implementation of a SANetwork

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This presentation will provide detailed information on identifying the need, research, design, development and implementation of a Storage Area Network at Franklin College.

Considering the increased usage of technology in today's classroom, the need for increased storage, reliability and disaster recovery becomes clear. Franklin College identified this need and found the solution.

This is a case study that will take you through the complete process of installing a Storage Area Network. Join us and learn from our successes and mistakes as we describe all the aspects of this project. Learn where we are today and where this technology positions us for the future.

(This paper was not available at the time the Proceedings went to press. The author will supply copies of the papers at his talk or provide a url if it is posted on the web.)

Nortel Networking: Becoming a Training Academy

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Introduction

Macon State College has become a Nortel Networking Regional Training Center. As such, we provide training to the Central Georgia region in this highly-desirable skill area. The benefits to us are:

- additional students
- $30K of free networking equipment
- highly-desirable training for college personnel
- more recognition as a supplier of market-driven skills for students.

The Training Program

Nortel Networks has established the NetKnowledge Program to provide a state-of-the-art networking curriculum to schools. Through the NetKnowledge Program, students can receive training to help meet the high demand for computer networking and telecommunications professionals in the 21st century.

The NetKnowledge Program also provides training for teachers at one of many Regional Training Centers(RTCs) around the country. The training provides teachers with the necessary foundation they need for teaching this course.

NetKnowledge is a four-semester series of courses covering the basic components of internetworking including routing, switching, integrated networks and emerging technologies. NetKnowledge also provides real business case studies in which students solve networking problems in true-life situations.

The Nortel Networks NetKnowledge Program has been written and developed in partnership with TERC, a non-profit research and development organization committed to improving science learning and teaching. Through the NetKnowledge program, students will develop a knowledge in networking and communication technology to give them the foundation they need for a future in the information technology industry.

Why Nortel Networks?

In addition to providing industry-leading networking equipment, Nortel Networks is partnering with schools to deliver high-quality technical education.

One of the ways Nortel is committed to education is by donating networking curriculum to its schools with the NetKnowledge Program. The NetKnowledge curriculum has been developed by educational research and development professionals who know how high school and college students learn, with emphasis on hands-on activities and lab projects.

In short, Nortel Networks offers the NetKnowledge Program to prepare students to design, build, and manage networks. The NetKnowledge Program is up-to-date, and futuristic, teaching students about emerging technologies and the future of networking.

Why now?

In the Information Age, knowledge of technology is a powerful predictor of success. Nortel networks is helping students acquire both knowledge and success by providing secondary and post-secondary schools with networking curriculum.

The U.S. Bureau of Labor Statistics reports that during the next eight years the computer and data processing services industry is projected to grow 108 percent, the most of any industry, producing over 1.3 million new jobs. It is projected that database administrators and computer support specialists will be the fastest growing occupations over the same time.

With the networking industry growing exponentially, Nortel Networks recognizes the need for this technology to be integrated in schools' curriculum. According to the Information Technology Association of America there are over 340,000 unfilled jobs required technology skills in mid- to large-sized U.S. companies. More than a powerful technology, networking is one of the fastest growing professions today. Nortel Networks is committed to help prepare its future practitioners.

The Nortel Networks NetKnowledge program is a four-semester sequence of courses designed specifically for secondary and post-secondary students. It consists of project-based lessons and hands-on labs designed to teach all students more than the basics in Routing, Switching, and Unified Networks.

NetKnowledge appeals to the full range of students, providing

- lessons and quizzes to test basic understanding,
- hands-on activities and labs to further competency,
- extension activities to challenge more able and willing students,
- complete assessment to test for competency and comprehension.

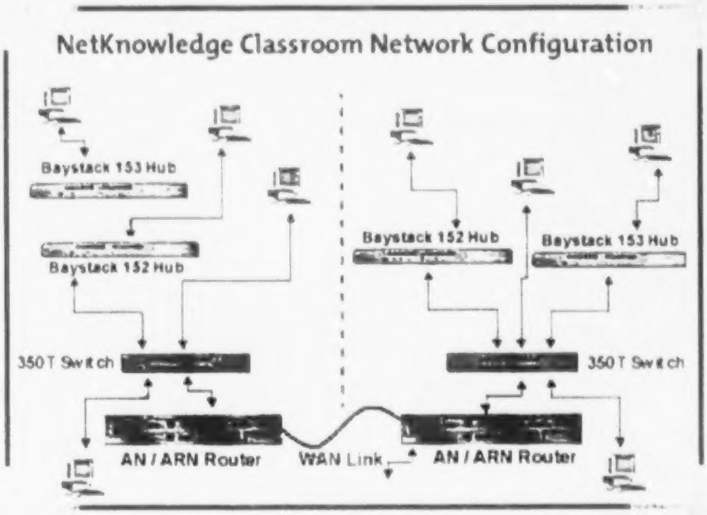
Curriculum is provided free of charge to program participants. Equipment for the NetKnowledge lab is provided at a greatly reduced price, or is free for RTCs. The appendix provides a detailed list of equipment provided, free of charge, to RTCs.

Baseline school-supplied hardware:

- 10-15 PC's, 64MB RAM, WIN95, CD-Rom, Monitors, 10 NICS

Baseline school-supplied software:

- Internet Explorer 4.01 or greater or Netscape Navigator 4.2 or greater
- Outlook Express
- Winzip (newest version)
- Acrobat Reader (free)
- CuteFTP (newest version)
- Eudora Lite (newest version)
- Adobe Pagemill 3.0 or higher
- Adobe Imagestyler 1.0 or higher
- ISP access to the classroom network
- Microsoft NT


NetKnowledge Classroom Network Configuration

Nortel Networks Hardware Package

- 2 ARN or AN Routers
- 2 350T 10/100 Autosense Switches (Layer 2)
- 2 Baystack 152 hubs
- 2 Baystack 153 hubs

Accessory Kit from Anixter/Ameritech

Sniffer Basic software site license - Ameritech

Teachers are trained in the program at regional training centers, which then provide support throughout program implementation.

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The program consists of three levels:

Regional Training Centers -- To receive training, teachers attend one of the Nortel Networks Regional Training Centers which have been established in locations around North America. Regional Training Center Instructors receive in-depth networking training at Nortel Networks' facilities. Regional Training Center Instructors will be a point-of-contact for teachers during the year to answer any questions.

Teachers -- Studies show that only 15% of a typical school computer systems budget is devoted to staff instruction, and less that 5% of all schools have full-time on-site professionals to help train staff. Nortel provides the technology training for those who are teaching the NetKnowledge curriculum. Training takes place at one of many Regional Training Centers (RTCs). Instructors at the Regional Training Centers have been trained by Nortel Networks to teach the teachers.

Teachers attend classes at their Regional Training Center to qualify to teach this program. An evaluation will be sent to teachers before entering the RTC so they can assess their knowledge of networking. A pre-study course may be recommended for those who need the basics before attending the training session.

Teachers receive the curriculum from Nortel's on-line web site along with receiving a CD of the curriculum. The CDs contain the Teacher Guide, Student Guide, Powerpoint Slide Presentation and How to Display and Print directions.

There is also be a web-site forum where teachers will receive information and have a continuous discussion with other teachers in the program.

Students -- The fastest growing industries are internetworking and telecommunications. NetKnowledge is the training students need to enter into these rapidly growing industries. The NetKnowledge program provides a curriculum that is designed specifically for secondary and post-secondary students; it is not re-purposed adult training. Students enjoy the NetKnowledge curriculum because of the hands-on projects and activity labs.

Students will also have email addresses of other NetKnowledge students so they can collaborate on projects together. This gives an opportunity to work with other students across the country and even around the world.

Students gain not only a solid conceptual foundation for advanced studies but also training that can be applied to certifications leading to high-tech industry jobs.

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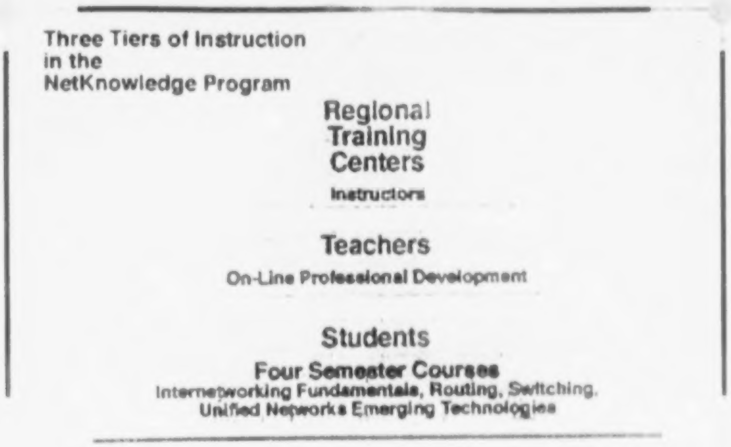
Three Tiers of Instruction in the NetKnowledge Program
Regional Training Centers
Instructors
Teachers
On-Line Professional Development
Students
Four Semester Courses
Internetworking Fundamentals, Routing, Switching, Unified Networks Emerging Technologies

Once students have completed the course, they are eligible for Nortel Networks certification.

After completing the NetKnowledge course, students can take NetKnowledge exam and receive a NetKnowledge Certificate. This shows that the student has completed 280 hours or more of networking instruction.

For those students who want further certification, they can take Nortel Networks Certified Account Specialist test at Sylvan Learning Centers and receive an industry recognized certificate which provides them a definite edge when applying for a job in the networking industry.

Students may also further their training and education in networking by taking Nortel-certified Core Technology on-line examinations through Sylvan Learning Centers.

The New Nortel Networks Certification Program Framework

The Nortel Networks certification program is modular, allowing candidates to choose the certifications that best meet their individual and business needs. The program is comprised of six designations that demonstrate varying levels of expertise. The certification framework offers candidates a natural growth path as they gain experience and add to their skill-set. Testing methodologies will be applied as appropriate across the certification levels and Nortel Networks solution sets. The new designations are:

- Nortel Networks Certified Account Specialist (NNCAS) This designation recognizes a fundamental level of Nortel Networks products, industry and technology expertise.
- Nortel Networks Certified Design Specialist (NNCDS) This designation recognizes a fundamental level of design expertise. These individuals participate in planning activities for networks that utilize Nortel Networks solutions.
- Nortel Networks Certified Design Expert (NNCDE) This designation recognizes an advanced knowledge of Nortel Networks products and solutions. Individuals earning NNCDE certification can develop optimal network solutions and detailed network designs

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based on customer requirements.

- Nortel Networks Certified Support Specialist (NNCSS) This designation recognizes a fundamental level of technical expertise that enables a candidate to deploy, operate and troubleshoot Nortel Networks solutions. These specialists provide the day-to-day operational support for today's sophisticated networks.

- Nortel Networks Certified Support Expert (NNCSE) This designation recognizes the ability to effectively implement, configure, support, troubleshoot, and optimize Nortel Networks solutions. Successful candidates provide advanced operational network support.

- Nortel Networks Certified Network Architect (NNCNA) This designation recognizes an advanced level of consulting, technical, and design expertise. To achieve this credential, candidates must pass a rigorous portfolio assessment, a highly regarded method for certifying advanced level practitioners, which allows candidates to illustrate and document significant dimensions of their professional life.

How to Get Started

Colleges who wish to become a Nortel training academy have a somewhat time-consuming process ahead of them.

First, you must determine whether you wish to become a Regional (RTC) or a Local Training Center (LTC). RTCs must offer train-the-trainer classes at least once each semester. They must also organize, pay for and implement whatever advertising they feel is necessary to secure LTC trainers to teach. On the other side of the coin, RTCs receive the free equipment previously mentioned. LTCs receive training from their RTC and do not have to pay for advertising to obtain students (the RTCs do this). LTCs are also not required to offer training classes every semester. However, they do not receive free equipment either.

Second, you must then contact Nortel Networks. The point of contact is Kim Smith at kmsmith@nortelnetworks.com. Once you discuss this with her, Nortel sends you an agreement for the type of training center you desire along with any equipment, etc which may be associated with that program. You must get this agreement approved buy your local authority (school district, etc) and returned back to Nortel.

Training for your trainers are covered by you unless you are a RTC. Then, Nortel picks up SOME of the costs.

Conclusion

Nortel Networks offers a training program for both students and teachers at high schools and colleges in the area of computer networking. Similar to the Cisco program of this type, this training aims to provide training which is critically needed in the IT industry today. We at Macon State College believe the Nortel program provides advantages over the Cisco program such as:

- the Nortel program is more flexible
- Nortel provides free equipment and training for us as an RTC.

These topics will be discussed in more depth at the Conference. Thank you!

Courtesy: Nortel Networks.

Implementing Instructional Technology: A Team-Based Approach

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I. Introduction

One of the biggest challenges in implementing instructional technology is the steep learning curve novices face, especially senior faculty. After twenty years or more of teaching, our classroom styles are pretty well set. Most of us were trained as linear thinkers, products of the Enlightenment; we hired typists to prepare our dissertations; and think of instructional "technology" as a piece of chalk and a blackboard. The bewildering array of software programs, arcane language of "computerese," and, perhaps, most importantly, the multi-dimensionality of the web can immobilize experienced teachers. There is a final Catch-22;" only by using instructional technology can you appreciate its potential for enhancing instruction and student learning. You really don't know what you don't know.

In Fall 1998 I received a Mellon Foundation Grant to incorporate instructional technology in a large survey course in Early United States history. I want to summarize my experiences with this project, especially the benefits of a team-based approach to developing and implementing instructional technology for uninitiated faculty. With support from DePauw University's Faculty Instructional Technology Support Center (FITS) a three-person team--a faculty consultant, a student intern, and the instructor--developed the course web site. Next I will show how we used the site as an instructional tool and, finally, conclude by sharing the teaching and learning outcomes--both anticipated and unexpected--in using this technology in a history class.

II. The Process

The FITS model for instructional technology is built around a team-concept; this approach was essential for this project. Teams consist of the classroom instructor, a faculty member knowledgeable about instructional technology, and a student intern familiar with web site design and construction. Each member had a distinct role. The instructor knew the subject matter and defined the pedagogical issues of the project. Dennis Trinkle, a historian and pioneer in applications of instructional technology in history, was the faculty consultant and brought awareness of the classroom environment at DePauw, understanding of theoretical issues in using instructional technology, and practical experience from his own history courses. Robbie Morse, a workstudy student and, later, FITS/Mellon intern, had extensive experience in web site design and construction and knew the software and hardware required for the project. After the project is implemented, the instructor receives training to maintain the site, but FITS staff provides on-going advice and support.

A. The Instructional Problem

The first step was identifying the pedagogical problem or instructional need that technology could help solve. A basic principle of FITS is that technology is merely one tool for meeting educational objectives and that technology should never be used as an end in and of itself. The team began by examining the existing educational outcomes of the course, assessing the quality of learning in the course, identifying existing impediments to students' learning, and envisioning ways instructional technology might help solve these problems.

The course is a survey of United States history from Columbus to the War of 1812 is part of the three-course U. S. history survey and enrolls 30 to 35 upperclass students. By the semester's end, I hoped each student would:

1. Understand the evolution of American society, institutions, and cultures from early colonization through the War of 1812.
2. Recognize ways varied sources are used to study our nation's early history.
3. Know how to read and evaluate primary and secondary historical sources by examining historical evidence critically and understanding the perspective or bias of different sources.
4. Learn basic history research skills using library and Internet sources.
5. Be able to express ideas clearly both in papers and essay exams and orally through active participation in class discussions.

While attaining basic knowledge of early U. S. history was important, the second and third outcomes were the most critical--and most difficulty to achieve. I wanted students to discover how profoundly, yet subtly, events and decisions of people in the distant past affect their world by reading classic historical texts that define the multiple meanings of "America" or capture experiences of representative groups who shaped early American culture and society.

Reading texts from the sixteenth through the eighteenth centuries poses real challenges for students, however. Before they can interpret a particular document's significance, they not only have to understand early modern prose but also need to place the document in historical context. In the past I relied on commercial readers but the convenience of an anthology is offset by inevitable compromises: the collection omits texts I needed and includes material I didn't want. Furthermore, they have limited visual materials to illustrate concepts. How could instructional technology help students become more skilled readers of primary historical texts?

I also wanted to expand the range of historical sources beyond printed texts. In class I often use visual materials to illustrate a point or as a primary source to analyze. Maps, charts, political cartoons, paintings, and architecture, and other visual images can be powerful learning tools, but one needs to apply the same critical tools used for texts to interpret them. Because these images were unavailable outside of class, their use in the course was severely limited. Some of the most exciting work in Early American history is in material culture and historic archeology, much of which is available on excellent web sites. Instructional technology was potentially a powerful way to expand the range of historical sources students could use to understand Early American history.

The team began the project with the idea of creating a web toolbox that would be a collection of instructional materials for lectures and for student projects and an archive of course handouts and requirements, readings, lectures, and primary sources that would be available to students to use outside of class. I could project an image in class, for example, and then ask students to study a similar set of images on the web site and write a brief analysis that becomes part of the next day's discussion. One could easily compare different texts or images simultaneously, for instance, the hierarchical interior space of Anglican Churches as compared to the egalitarian space of Great Awakening Churches. Over time, I planned to add background information on particular texts and images, a glossary of unfamiliar words, links to additional resources, etc.

The initial thinking, thus, was to use new technology to improve old pedagogy. As the project developed, however, unanticipated possibilities emerged. A class of thirty students tends to rely on the instructor for their learning looking for lectures to provide course content and models for analyzing source and by participating in instructor-lead discussions. I have experimented with different formats, such as learning groups and student oral reports, but was never completely satisfied with the results. We explored ways instructional technology could increase student-initiated learning and added an electronic communication link, a DISCUS bulletin board, to the project.

B. Constructing the Web Site

The team was essential for keeping my learning curve to a manageable level. Trinkle focused on how to design a web site that could meet the project's goals. He had me look at a number of history course web sites and we discussed what I thought worked well and what didn't. He also provided readings on principles of good web design: content comes first, design follows purpose, consistent page format, uncluttered page layout, including lateral links within the site, and so on. He provided URLs to sites with style manuals, advice on writing papers, and the like. Finally, he emphasized the importance of making the web site indispensable to the course. We had many conversations about how students would use the web site: As an archive of course documents (syllabi, lectures, and assignments, etc.)? As a resource for non-text materials? As a file of supplementary readings and reference materials? How should the bulletin board be linked to the main site? How were students going to navigate around the site? What internal links were needed?

At the conclusion of this part of the project we had a very rough template for the site (Illustration 1) that laid out the main headings and outlined a structure for organizing information. As you can see it was (and remained) a work in progress, and the final site didn't follow the outline in its entirety. The purely informational sections proved less useful, for examples, while the resource section expanded enormously from the original plan.

Robbie Morse provided technical expertise which enabled our discussions to focus on implementing the learning goals and not on the mechanics of site construction. He used Front Page for web layout and navigational tools, Java script for the images, and Dreamweaver for the pop-up windows. The class web site was located on the I[Instructional]-drive on the campus network. This functions as an intranet site; access was limited to students enrolled in the course. All living units are wired to the network; students living off campus or without computers had to use one of the computer labs. Because the Discus bulletin board is on the university server and accessed through netscape, we added several links to Discus from the web site.

As I located images for the site--maps, cartoons, paintings, architecture, etc.--Morse suggested ways to organize them to facilitate student use. As the site grew, he included internal links between different sections of the site. Morse first encouraged me to include a Discus bulletin board and we worked out its role in the course. He made numerous suggestions about improving the visual layout of web pages and trouble shooted each section as it was added to the site. As a recent graduate Morse could also anticipate problems students might have using the site and suggested many small but significant improvements. As with any site of this size there were many bug that had to be worked out, especially with the pop-up windows, and without Morse's hundreds of hours of work, it would have been impossible for me to complete the project.

At the beginning of the semester, we had completed the main sections of the site and the first month of assignments. Morse and I continued to work on the site over the course of the semester. While this was a bit risky--and stressful for Morse with several just-in-time deliveries--it provided us intermediate feedback on how the site was working and made enabled us to make modifications as we went along.

Contrary to faculty folklore, not all undergraduate students are computer geniuses, and history classes, in particular, attract a surprisingly large number of computer avoidant and even computer phobic students whose computer use is confined to word processing and e-mail. Morse created handouts explaining how to access the web site and log onto the Discuss bulletin board. He also led a lab session the first week of the semester to walk students through the process; even after two weeks, about a fifth of the students reported difficulty accessing the site, especially from living units! Morse provided similar support for me, coming to class for the first few weeks until I became comfortable using the computer and projector and navigating the web site. He monitored student use of the site and communicated by e-mail with students having difficulties. His continued support, especially the first weeks in the semester were essential for a relatively smooth launching of the project.

III. Outcomes:

Much of the site is pretty straight-forward. The opening page (Illustration 2) has a large graphic of portraits and images of the American Revolution (there was a similar graphic for the colonial period) with the main table of organization: Home, Overview, Instructor, Syllabus, Assignments, and Resources. This table is repeated on the side and at the bottom of every page to facilitate lateral navigation throughout the site. The on-line syllabus has links to assignments and resources which are missing in the print version handed out at the beginning of the semester. This feature is repeated in the Assignments section, which include hot links to Discus, readings in the Resources section, and web sites.

The heart of the site is the Resource section, which is organized into subsections: Articles, Images, Lectures, Maps, Sound Documents, and How to "Ace" this Course. Sets of images and maps are organized separately into topical or chronological blocks, each with their own label, that are keyed to units of the course (see Illustration 3). Each image and map is labeled individually.

Let me illustrate some of the ways the site was used over the course of the semester:

Images were incorporated into lectures replacing overheads and slides. Almost all of my lectures use maps; scanned images are a vast improvement over photocopied reproductions used for transparencies, as I have far more choices in selecting maps, cartoons, engravings and the quality of reproduction is much better. Two lectures examine painting and architecture in the colonial and revolutionary era to illustrate cultural developments. Illustration 3 includes European graphic representations of the "New World." Read in conjunction with Christopher Columbus's written accounts to Ferdinand and Isabella in 1493 describing the New World we examined how Europeans conceptualized indigenous people in terms of their own culture to justify conquest.

The Discus bulletin board transformed the nature of discourse in the class. In addition to formal papers, students write informal responses to reading assignments and films, and summaries of small group discussions. Although the latter are often reproduced for the entire class, most responses were private communications between each student and the instructor. The Discus site provided a way to make these exchanges public. Early in the semester I show the film "Black Robe" on French encounters with native peoples in the 1630s. Students were asked to read a movie review and post their reactions to Discus (Illustration 4). They were far more thoughtful and more extensive than private responses I had received in previous classes. Discus was used extensively over the semester to post individual responses to readings and films and reports from small learning groups. I also used it to collect review questions, comment on exams, and post topics for group work. The entire class was involved in a more open way in the collective learning process throughout the semester.

Finally, the web site facilitated small group student oral presentations using material culture to investigate topics that expanded on class lectures and readings. Most resources students needed were either in the Resources sections of the Web site or on web links in the on-line version of the assignment. Since I would not be covering this material and it would appear on exams, most students took this project seriously. Students had lots of choice in selecting topics, and we heard analyses of graphic images and cartoons on the web site; virtual tours of colonial cities; archeological reconstruction of early Jamestown; a video report on the Feast of the Hunter's Moon near Lafayette, Indiana; an analysis of the historical accuracy of the film The Patriot (including film clips); and even composed new words to revolutionary songs! Most groups used presentation software in their reports to integrate images from different sources and not merely to project electronic outlines. (The university's Speaking-Center also provided support and practice space.) The quality of these most recent presentations was, in general, stronger than those from an earlier class that did not use technology. Some presentations were more successful than others, but the assignment fulfilled the goals of expanding the range of sources, making students more responsible for their learning, and energizing the class.

IV. Conclusion

How did the students do? Their reactions in written course evaluations to instructional technology were mixed, but were generally much more positive than negative. Several students wrote in their course evaluations that the site enabled them to keep connected to the class, and others especially noted the value of the student oral presentations. This positive note is encouraging as there were several "technogically-challenged" students in the class. The discus bulletin board was also revolutionary, as students posted responses to one another not just to the instructor. As expected, not every student was comfortable with technology, to the more open dialogue of student work, and to an increase in student-initiated learning.

I learned that instructional technology changes pedagogy more than content. I was expecting to incorporate material culture more fully in the class, but I did not anticipate that in the process of making more resources available to students outside of class my role as a purveyor of expertise would diminish. I began to see classes more as laboratories for learning how to read primary and secondary sources, for finding broader patterns in the data, for integrating different perspectives, and for asking questions. I had to adjust my expectations on how to use class time effectively and to communicate changing expectations to students. Finally, I learned to be prepared for technological crashes, or what to do when the server went down!

I noted earlier that instructional technology is a process not an end. Robbie Morse's final project was creating a guide to the web site to (hopefully) shift responsibility for maintaining and revising the site to me. I have a long list of changes for the fall--editing the image collection, creating links between lectures and images, adding more student assignments using the site and discus, and finding effective ways to evaluate the quality of Discus postings. (I never used the individual portfolio feature of discus that allow for private communication between the instructor and individual students.) I can still call on Robbie as my "life-line" and bounce ideas around with colleagues engaged in similar experiments with instructional technology. Every journey begins with the first small steps; even small steps can lead to significant changes. Without the support of my team at every stage of the project, I could never have undertaken this project. I began this journey as a "curious non-user;" I hope I have graduated to "enthusiastic novice."

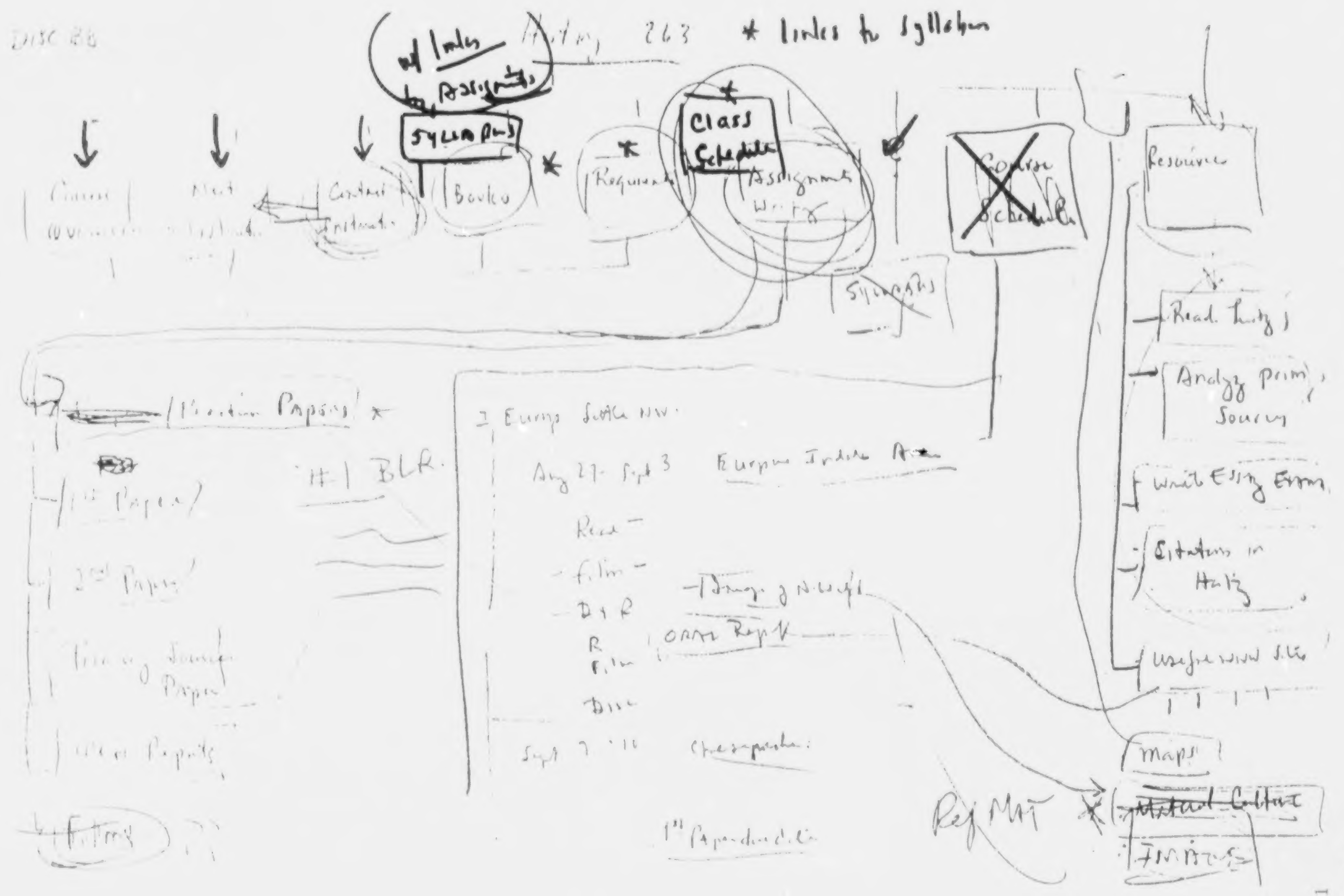

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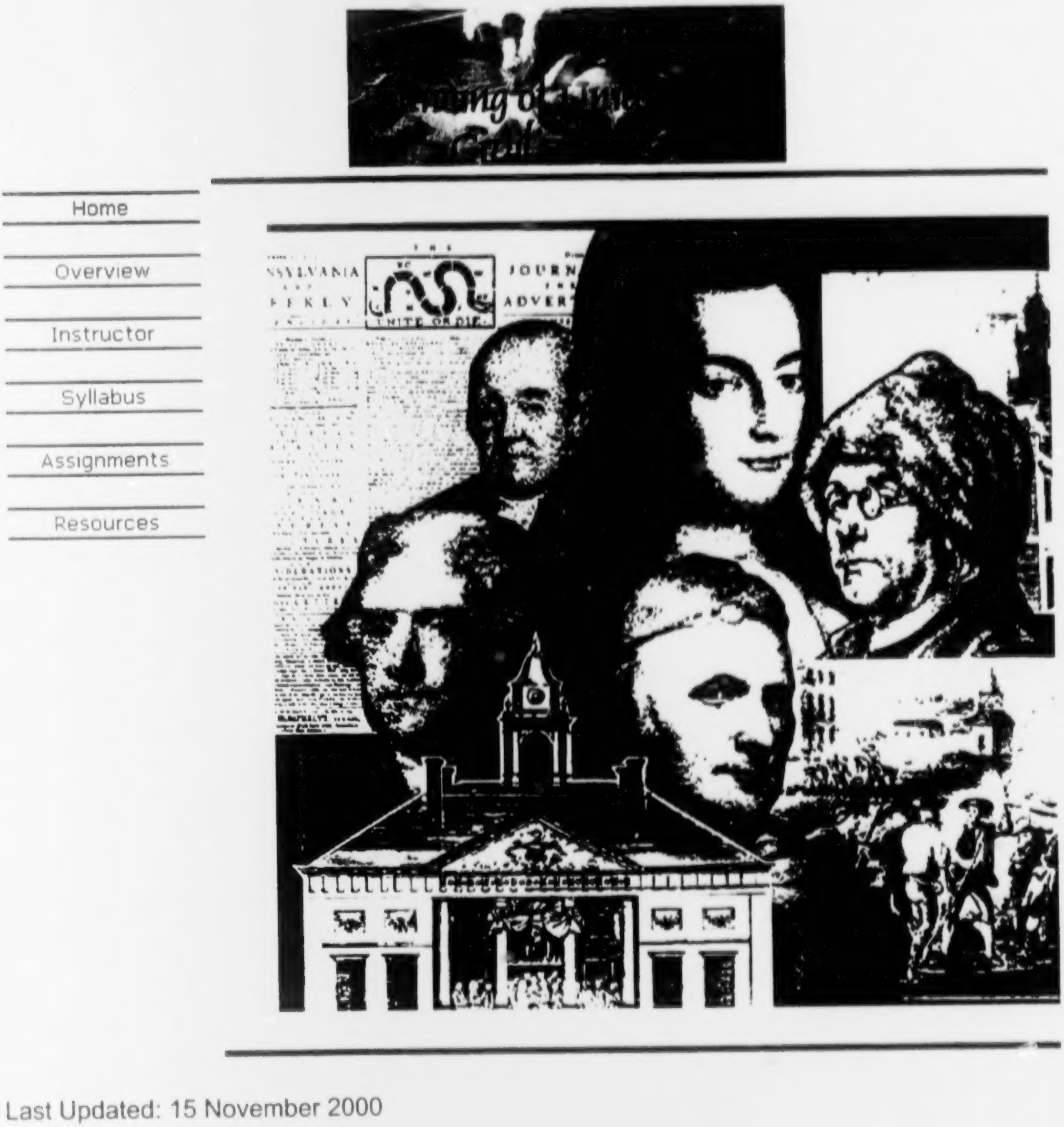
Illustration 1



Last Updated: 15 November 2000

Illustration 2

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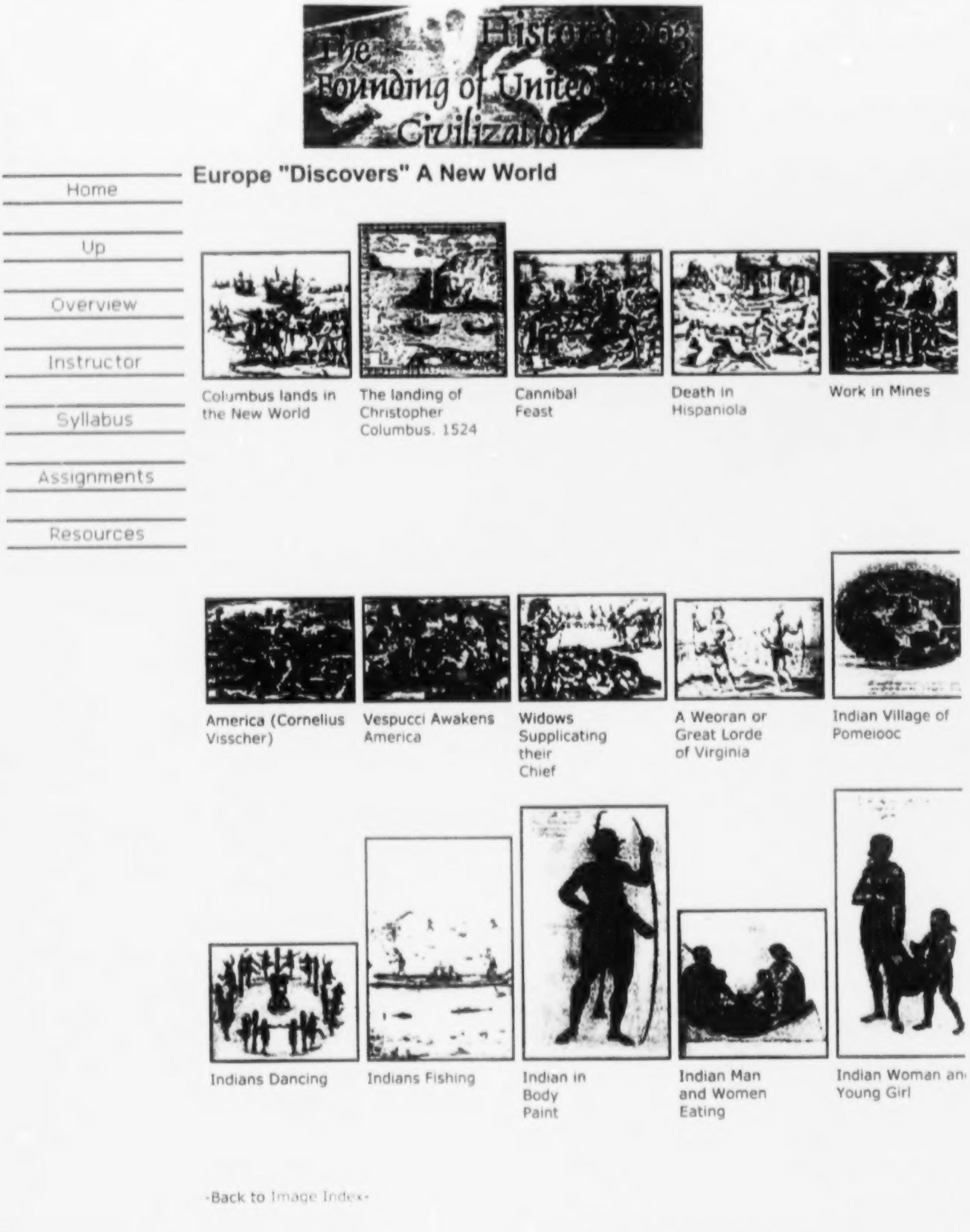

Home

Up

Overview

Instructor

Syllabus

Assignments

Resources

Europe "Discovers" A New World

Columbus lands in the New World

The landing of Christopher Columbus. 1524

Cannibal Feast

Death in Hispaniola

Work in Mines

America (Cornelius Visscher)

Vespucci Awakens America

Widows Supplicating their Chief

A Weoran or Great Lorde of Virginia

Indian Village of Pomeiooc

Indians Dancing

Indians Fishing

Indian in Body Paint

Indian Man and Women Eating

Indian Woman an
Young Girl

-Back to Image Index-

Illustration 3

-Home-Overview-Instructor-Syllabus-Resources-

Last Updated: 13 September 2000

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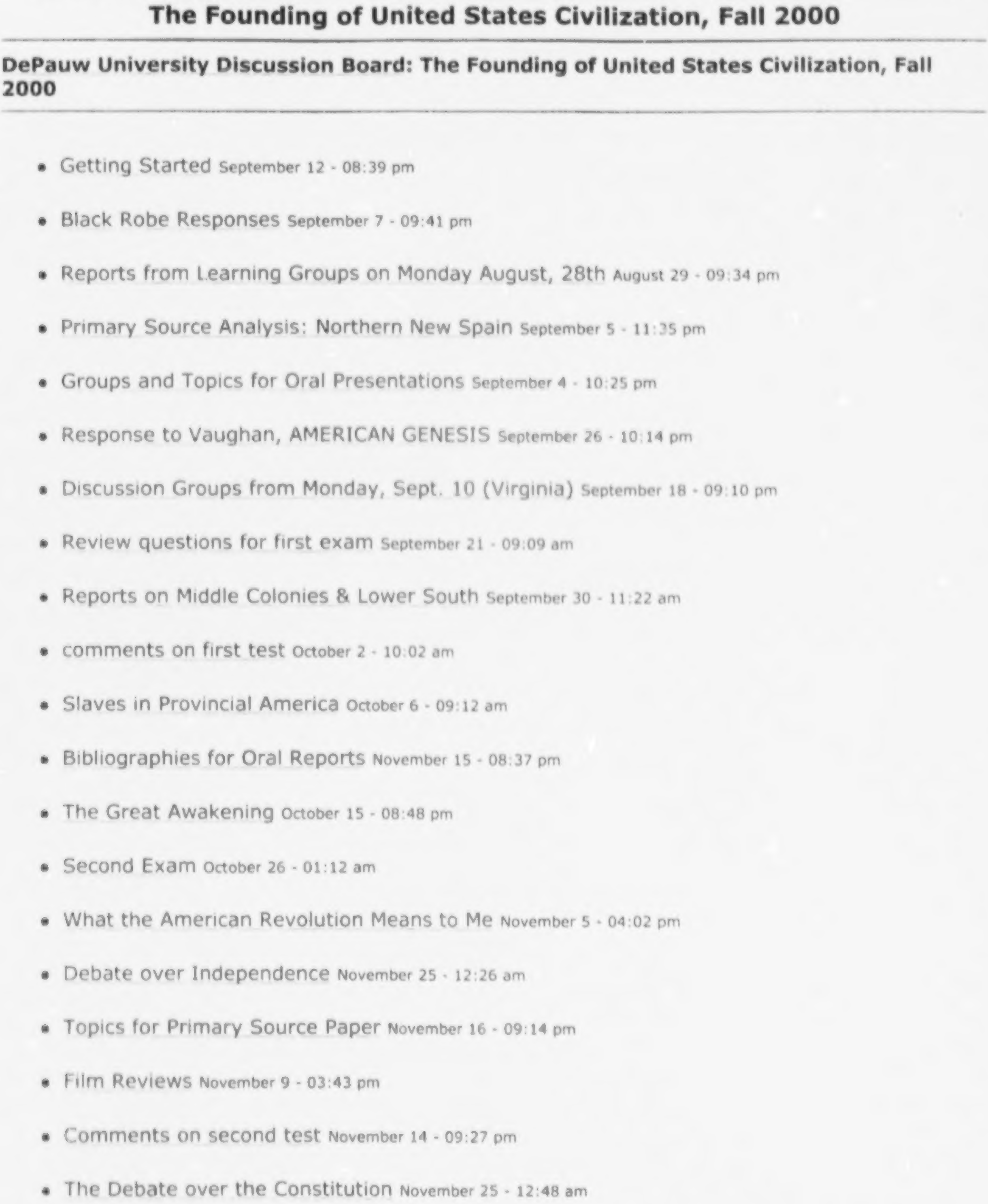

The Founding of United States Civilization, Fall 2000

DePauw University Discussion Board: The Founding of United States Civilization, Fall 2000

- Getting Started September 12 - 08:39 pm
- Black Robe Responses September 7 - 09:41 pm
- Reports from Learning Groups on Monday August, 28th August 29 - 09:34 pm
- Primary Source Analysis: Northern New Spain September 5 - 11:35 pm
- Groups and Topics for Oral Presentations September 4 - 10:25 pm
- Response to Vaughan, AMERICAN GENESIS September 26 - 10:14 pm
- Discussion Groups from Monday, Sept. 10 (Virginia) September 18 - 09:10 pm
- Review questions for first exam September 21 - 09:09 am
- Reports on Middle Colonies & Lower South September 30 - 11:22 am
- comments on first test October 2 - 10:02 am
- Slaves in Provincial America October 6 - 09:12 am
- Bibliographies for Oral Reports November 15 - 08:37 pm
- The Great Awakening October 15 - 08:48 pm
- Second Exam October 26 - 01:12 am
- What the American Revolution Means to Me November 5 - 04:02 pm
- Debate over Independence November 25 - 12:26 am
- Topics for Primary Source Paper November 16 - 09:14 pm
- Film Reviews November 9 - 03:43 pm
- Comments on second test November 14 - 09:27 pm
- The Debate over the Constitution November 25 - 12:48 am

Illustration 4

What if J. Alfred Prufrock had been a Computer Science Professor? An Essay on the Overwhelming Question of Technical Obsolescence

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I have seen the moment of my greatness flicker,
And I have seen the eternal Footman hold my coat, and snicker,
And in short, I was afraid.

Abstract

I am a 40-something professor of Computer Science, and like J. Alfred Prufrock, I have a bald spot in the middle of my hair. I am feeling increasingly anxious over the possibility of becoming technically obsolete. This fear arises not from a decreasing desire to remain current, but from the increasing realization that there is too much to know and too little time to know it. Worse yet, there is often little rationale for deciding what to learn and painful consequences for making the wrong choice. Is it any wonder that I lay awake at night wondering if Java is just a fad? If every word related to business and communication will be prefixed with "e-"? If all the overhead transparencies that I converted to PowerPoint and then to HTML will become like so much chalk dust with the next delivery technology? So what's a professor to do? Throw up his hands in despair? Seek a positronic brain implant? Or is there a path of graceful degradation?

tech·ni·cal ob·so·les·cence (tĕk'nĭ-kəl ob'so*les"cence), n. the property of being out of date and not current with skills or practical knowledge in a scientific field.

Let us go now, you and I…to lead you to an overwhelming question. I have fond memories of the IBM 029 keypunch. Let me explain. It was the Spring of 1973. I was embarking on the career I had dreamed about for years: becoming a computer programmer. As an avid reader of science fiction during my childhood, I had become filled with wonder at the possibilities of technologies present and future: robots, spaceships, and yes, computers. While Gort and the Enterprise seemed beyond the reach of my lifespan, HAL, well, that was a different story. Computers were *real*. HAL was just over the digital horizon. And someday I was going to explore that frontier, to finally go where only my imagination had gone before.

So there I was, sitting at the keypunch, slowly, carefully transforming a stack of 80-column punch cards into a FORTRAN program. I made a lot of mistakes, but after thirty minutes or so I emerged triumphantly from the keypunch room, card deck in hand, with chads clinging like fairy dust to my clothing. It was a magical moment. With great anticipation I handed over my deck to the computer operator. As he walked away I leaned over the small counter and caught my first glimpse of THE computer. It was an IBM 1401. It was nothing like HAL, but it was mesmerizing none-the-less. Lights blinked. Tapes whirred. Printers clacked. And cards shuffled through the reader as if by the hands of a casino dealer. I watched my deck being loaded, and, after a small hesitation, the greenbar listing emerge from the printer. The paper was still warm when I examined the listing. It was full of compiler errors. A character in the wrong column here; a misspelled variable name there; a missing label somewhere else. It didn't matter. I was on my way. A few trips back and forth to the keypunch room and I had successfully written my first program.

That 029 and I became quite close during the next three years. Over the course of the thousands of cards I punched, repunched and overpunched, I discovered marvelous features such as the programmable drum and the DUP key. And the chunk-chunk-chunk of each key press became like a soothing melody (although I must admit that the concerted sound of the keypunch cluster may have adversely affected my hearing more than the rock music of the day). The 029, the 1401, and FORTRAN: from my first tentative DO loops and DIMENSION statements to external sorting, linear programming, and compiler construction, I exulted in the theory and practice of programming with these steady tools.

But nothing lasts forever. The half-life, no, make that the full-life, of computer technology seems to be about three years. When I entered graduate school, I discovered that my expert FORTRAN and keypunching skills were already obsolete. Pascal and PROCSY (Purdue Remote On-line Console System, an acronym that I may or may not have remembered accurately) were the rage. Only Numerical Analysts, the Neanderthals of Computer Science, still used *that* prehistoric language. Leaving behind the technology I had grown so familiar with was surprisingly simple: I learned Pascal in a few days, combing through the famous Nicklaus Wirth text, and after a session or two with PROCSY I knew I could never punch another card again. I adapted easily to the new technology, my brain still as pliable as a new can of Playdough.

The years passed. I graduated and become an Assistant Professor. Minicomputers arose with accompanying terminal servers. Line editors evolved into full-screen editors. FORTRAN and COBOL did not die as had been expected, and evolutionary niches were found for many other languages such as RPG, Lisp, and PL/I. IBM continued to dominate the mainframe environment with MVS, and DEC had a winner with VMS. Structured programming, soon followed by structured *everything* a la Yourdon, became the guiding principle in software development.

And I knew them all quite readily, knew them all. Glided deftly from one technology to the next, ever-expanding my reference collection. It was not unusual for me to be teaching courses that used three different languages on different platforms. But I was beginning to notice something strange: Not all of my colleagues were as excited about these new developments as I. In fact, some of the senior faculty had retreated into a small corner of the curriculum; and others seemed unwillingly, or perhaps unable, to modernize their courses, leaving the content grow stale. I couldn't understand their hesitation, and in my youthful insensitivity, did not sympathize with their hidden struggles against intellectual entropy.

More years passed. The microcomputer revolution began. I wrote a grant to purchase three PCs for the Department, but when they arrived they little more than curiosities. A couple of Apple IIs and some other long-forgotten brand (Was it a Northstar Horizon?). DOS entered my vocabulary. I earned tenure. I was promoted to Associate Professor. I was awarded a sabbatical leave. During my leave I became engrossed in applications of AI to electronic warfare, and didn't notice that the world had changed again.

I had an IBM microcomputer on my desk next to my VAX terminal. It ran Windows 3.0. I had no idea how to open up a file or execute a program. This graphical interface was completely foreign to my experience. I had to learn how to interact with a computer all over again. From scratch. To complicate matters, Ada, the language commissioned by the Department of Defense, was now our Department's official language. New hardware. New OS. New programming language. New editors and compilers. And did I mention that the University had just obtained an Internet connection? All of this new technology was very exciting, but demanded that I once again shed, like an old snake-skin, much of what I had known. It demanded that I once again retrain myself.

It wasn't quite as easy this time. Was there that much more to learn? Or was I, like a sopping sponge, less able to absorb any more? I had no time for philosophical reflection, needing every moment to keep one step ahead of my students. I read a lot. I practiced a lot. I sought the aid of my colleagues a lot. Sometimes it wasn't enough. Have you ever had that dream where you sit down to take a test and realize that you know nothing? Sometimes I felt like that when a student would ask a question that I couldn't answer. It was an uncomfortable moment, a humbling moment, a desperate moment. After all, I am supposed to be the expert. And no, I'm not being too hard on myself: I think I should know everything in an introductory programming class! For the first time, I felt vulnerable about my Computer Science knowledge, and had a small, nagging doubt about my competence rumbling around my subconscious.

Not to worry. I eventually conquered Windows, Ada, and the Internet. I regained my old form, but I no longer felt intellectually invincible against the consuming fire of the dragon of technology.

More years have passed since then. Technology has changed radically again. It's now objected-oriented everything, Java everything, and network everything. Advances in all things hardware, software, and, here's a hot term, middleware. Acronyms enough to make a kettle of alphabet soup. And let's not forgot that as technological content has changed so has content delivery. Distance education on the web is the next big thing. Pressure from all sides to create e-courses. And could you include streaming audio and video with that?

I am teaching in a discipline that is moving at warp speed and has more dimensions than "Sliders". I was starkly reminded of this last summer. I do some corporate training now and then, mostly targeting Java developers. I was completing a seminar on design patterns when one of the lead developers asked if I would be willing to teach some workshops on advanced Java programming. He just happened to have a list of potential topics with him. I glanced at the list: Servlets, JSPs, JDBC, JNDI, XML. I knew the "J" stood for Java, but what the heck was all that other stuff? Even in the field of Java technology, I had fallen behind the curve in a very short time. That realization was scary. Very scary.

Which leads me to the overwhelming question: Is technical obsolescence inevitable?

I grow old...I grow old...I shall wear the bottoms of my trousers rolled. Before I answer that question I want to explore what I believe is required to be a technically competent teacher of Computer Science.

Foremost is a firm grounding in the fundamental knowledge of Computer Science. I won't bore you a philosophical treatise on what comprises the fundamental knowledge of Computer Science. Others have wrestled with this question for decades, so I will point you to the thoughtful definition articulated in the evolving ACM Curricula 2001 recommendations [ACM01]. Glass [Glass00]refers to this as state-of-the-art knowledge. I must be able to teach what authorities in the discipline say is important to teach!

Secondly, an understanding of the real world. This is similar to Glass' state-of-the-practice knowledge. There must be a strong connection between the skills taught in the classroom and the skills applied in the workplace. It's fine to be on the leading edge of the technology wave, to anticipate the needs of employers, but it is disaster to allow that wave to wash over me. In the mid-eighty's my Department modified its entire curriculum to focus on Ada. It seemed a logical thing to do since the principal employers of our students were DoD contractors. There was a need and we supplied it. Fifteen years later the DoD rescinded its mandate, and Ada was suddenly an orphan (at least in the U.S.) Though strong pedagogical arguments remained for it use in teaching programming, it soon yielded to Java as our primary language. Why? Simple supply and demand: Java was fast becoming the lingua franca of the Internet and the need for Java developers was exploding. I must be able to teach what employers in the discipline say is important to teach!

Thirdly, adeptness at applying the tools of the trade. You know the old saying, "Those who can, do; those who can't, teach." How about that other one, "If you talk the talk you got to walk the walk." Talking about programming is not enough. If I want to be effective in the classroom, I must be able to build a program. I must demonstrate that I can do what I am asking my students to do. This assures my students that I am not some Wizard of Oz who has nothing behind his curtain of words, helps me to anticipate their problems, and, most importantly, gives me self-confidence. To build programs requires that I know how to use modern program-building tools. During the past year these included Rational Rose, Borland Jbuilder, Microsoft Visual C++, FrontPage, IIS, Explorer and Access, Apache Tomcat, Netscape Communicator, and Oracle. A far cry from the flowchart templates and coding sheets of my first years as a teacher.

I would also include here tools that I use to create and deliver course content. My students are more mobile and more time-starved than ever before. For many of them to be successful, they must have access to course materials anytime from anywhere. The Continuing Studies Department is also interested in leveraging new technologies to expand its offerings to non-traditional students. Today, that means hosting courses on the web. Since I do not have minions of web developers from the Department of Instructional Multimedia Development for Weary Professors waiting to do my bidding, I must create my own content. Of course, this requires another suite of tools. At the moment, these include Microsoft Office, FrontPage and WebCT. Education is a two-way street, so I also extend these tools to include email (I use Novell Groupwise) and products such as Microsoft NetMeeting for supporting more sophisticated interactions. I must be able to teach with the tools that confirm my expertise and conform to students' needs!

In a minute there is time for decisions and revisions which a minute will reverse. So what's the big deal? To fend off technical obsolescence I must keep up with changes in the discipline, the marketplace, and the tools. That doesn't seem so bad. I've been doing it for more than 20 years. How? It's not rocket science. You read. You read some more. And when you're done reading you find something else relevant to read. Then you do. You do a lot. Sometimes you redo what you've done because of something else you have read. Finally, you take what you've read and what you have done and make it palatable for the masses. All it takes is desire, time, effort.

Ah, but therein lies the problem. The desire is still there burning as hotly as ever, but it takes more time and more effort for me to learn and integrate new knowledge than 20, 10 or even five years ago. I am growing old. I am slowing down. Technology isn't.

Actually, the problem is thornier than that. It's not only the speed with which technology is changing, it's the competitive nature of technology. I just realized today that the Java 2 Enterprise Edition is only about a year old. Microsoft has recently introduced the competing .NET suite. And there are the older server-side technologies based on CGI (perl, php, etc.) Will one technology dominate or will there be an unpeaceful coexistence? Even a dominant technology today could be replaced tomorrow.

And should I then presume? And how should I begin? Faced with dwindling intellectual efficiency technical obsolescence may be inevitable for me and it may be hastened by an inopportune choice of what technologies to pursue. So what should I do? Should I simply deny what's happening and blissfully head for the technological abyss? Should I throw up my hands in despair? Should I, like Prufrock, retreat into the depressing loneliness of "a pair of ragged claws scuttling across the floors of silent seas" awaiting the end? No. As a colleague mine often said, "We are engineers. We solve problems." Here's my solution to this dilemma, or the top six ways to ensure graceful degradation.

6. Accept your limitations. I love to play basketball. I was never the fastest or tallest player on the court, but I hustled. As a result I often got loose for a fast-break basket. Twenty years later, I still love to play basketball, but I can no longer beat anybody down the court. I still play hard, though not as long, and contribute with my defensive hustle. Adjusting my game to my physical limitations has allowed me to continue to play, and enjoy basketball. I believe the same is true for teaching Computer Science. When I was younger I knew a lot more about a lot more. I no longer have enough time or energy to keep informed of all the technological advances. But I take solace in the fact that I still know a lot about some things, and some about a lot of things. I still enjoy learning and exploring new technologies while limiting my scope of interest. As for the rest, well, I can leave that to others; I no longer feel I have to know everything to contribute something.

5. Read. I've always done this. It's one of the simplest ways to find out what's hot and what's not. I try to read at least one article every day from either a trade publication or academic journal. And I constantly review textbooks for subjects I teach. It's the most practical way to cull the most important recent developments and which technologies are on the most solid ground.

4. Let your students teach you. There always seems to be a subset of majors who are more curious, more motivated, and more intellectually endowed than the rest. Use them to your advantage. Sign them up for a directed studies course on a topic of mutual interest. Give them the responsibility to become the expert and demonstrate their expertise to you through appropriate papers, presentations and projects. I have found this to be an effective means to learn about a single technology, such as JavaServer Pages.

3. Keep one foot in the real world. Look for consulting opportunities, preferably those that allow you to apply rather than teach computer science knowledge. It is not always easy to leave the relatively safe confines of the ivory tower, but it is always rewarding. Rarely have I taken a consulting position that didn't demand learning some new technology or some technology more intimately. For example, I have had a long-term relationship with a local ISP. In the beginning, I reluctantly, and with much trepidation, took on the duties of a system administrator. It's one thing to teach about networking; it's another to actually configure and troubleshoot networks. My theoretical understanding served me well, and I picked up invaluable practical knowledge that has enhanced my classroom. I now look forward to each summer for the challenge of the next real world opportunity.

2. Work smarter. One of the most valuable lessons I've learned as I mature is that I don't have to do everything myself. There are plenty of resources available to support my teaching responsibilities. The two I have found to be the most valuable are book publishers and the Internet. The quantity and quality of ancillary resources for Computer Science textbooks has improved tremendously during the last decade. Where before I was fortunate to have an Instructor's Manual and test bank I now can obtain almost everything my heart desires: sample programs, PowerPoint slides, laboratory manuals, and Internet links. And speaking of the Internet, I have discovered a wealth of tutorials and sample programs for almost every course I teach. On occasion, I have even found a kindred soul who is teaching very similar content and has placed all his/her materials on the web. (Yes, there are copyright issues to resolve in order to use this strategy. I am confident you will find great cooperation here!) Using these materials, I have more time to focus on course content rather than delivery, and therefore, more time to learn the next new thing.

1. Do few things, but do them well. St. Francis of Assisi gave us this wisdom to live a happy and fruitful life. Given my limitations, I will only become frustrated if I try to know too much or do too much. I must realistically assess what dogs in the Computer Science pack I can run with and then focus my training there. I may teach a smaller set of courses. I may use a smaller set of tools. I may let my more youthful and ambitious colleagues shoulder more responsibility for course and curriculum development. Whatever I choose to do, I will do with the same enthusiasm, commitment, and desire for excellence as I have always done. And that will lead to a happy and fruitful professional life.

And indeed there will be time to wonder, ' Do I care? ' and, ' Do I dare? ' . I have mused long and thoughtfully over my plight, the dreaded specter of technical obsolescence. And over these many words I have given you a glimpse of my personal journey. I would hope that you found something familiar, a partial reflection of your own experiences. I certainly care about my diminished ability to keep current. It is an uncomfortable feeling. But unlike poor Prufrock, I have not been paralyzed by indecision into doing nothing for fear it will be the wrong thing. I have a plan. It may not be a perfect one, but I think it is a good one. Only time will tell. If things don't work out, well, there's always golf....

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Assessing Student Fluency in Information Technology

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Abstract

In a society in which almost every college graduate needs to be fluent in the use of technology to gather and evaluate information, it is irresponsible for colleges not to ensure that students can meet these information technology challenges. The National Research Council has defined IT fluency to include the understanding of IT concepts and ability to handle high level thinking as well as possession of IT skills. This paper describes the process used by Saint Mary's College to help students assess their fluency level and set goals to ensure they are fluent by the time they graduate.

Introduction

This student fluency project arose out of the brainstorming a group of us at the college were doing to start a Teaching, Learning, and Technology Roundtable (TLTR). We defined the mission of our TLTR and agreed that the most pressing issue we were facing was student, faculty, and staff fluency in information technology as described by the National Research Council [1] and the Association of College and Research Libraries (ACRL) [2]. Since the faculty and staff fluency problem was quite daunting, we decided to focus on student fluency first. The entire effort is documented on the web at www.saintmarys.edu/~psmith/fluency.html [3].

A group of faculty and staff from the TLTR steering committee, student affairs, and the faculty department liaisons met in September, 2000, to discuss the issue of student fluency with information technology, how to assess it, and how to make sure that every student who graduates from Saint Mary's can function effectively in a technologically-oriented world. Some of the issues we considered are as follows:

1. Students come to us at a variety of levels of IT fluency. We can say with almost certainty that no arriving student is any longer computer phobic. (The need to communicate via email and use a word processor has forced everyone to overcome their fear of computers).

2. Although students are comfortable using the internet, they all need to learn how to separate the wheat from the chaff. This analysis of web information must be part of IT fluency

3. Students appear all along the continuum from novice to experts in understanding and using information technology. To assess where they are, we need a rubric which identifies different levels of fluency and some identifying characteristics of each level.

4. Many (perhaps most) students are motivated to improve their level of fluency on their own once they are aware of the possibilities.

5. It is important to create an atmosphere of high expectation and support rather than a focus on requirements.
6. In addition to classwork opportunities to improve fluency in information technology, we must create co-curricular opportunities, such as an SMC TV station, a video yearbook, or student grant projects. Perhaps we can create support groups (like RESNET) for various needs in the Residence Halls so students can improve their fluency by helping others.
7. Bringing back graduates, or using them in other ways to exhibit the level of fluency needed in the workplace, would motivate students.
8. We may be legally obligated to make sure students use the internet wisely and understand the consequences of their actions on line.

We brainstormed a number of ways to ensure that each student improves her level of information technology, but did not attempt to rank these or even to discuss them in depth. Some of the ideas are as follows:

1. Have each student create a technology portfolio into which she puts evidence to support her assessment of her fluency level.
2. Have each student develop a project (such as a sophisticated web page), with her advisor, which she works on during her four years and which constantly challenges her to improve her IT fluency.
3. Give students a technical exam administered by a national testing service.
4. Require a course or sequence of courses through which students learn IT concepts and improve IT skills.

One constraint that kept coming up was time. Whatever we decide to do will come on top of an already very intense course load for both students and the faculty who must assess their fluency. For example, the curriculum committee will not allow any additional course requirements without removing one of the current requirements. Since the strategic plan curriculum task force is currently studying the curriculum, it is a good time to be making IT fluency proposals.

Creating a Rubric for Self Assessment (Appendix 1)

We decided to spend a month trying to set up a rubric to be used in assessing a person's level of IT fluency. We compared the rubric to a ladder which specifies the rungs that a student can climb to reach higher levels of IT fluency. We asked if the rubric was a single ladder for all students or was really many ladders, one for each discipline. We agreed to push for the single ladder approach since the multiple ladder theory was so complex that it seemed impossible to define. Concern was raised that a work load similar to that to handle our two-tiered writing requirement will be placed on faculty if we are not careful in implementing an IT fluency assessment process. It may be a violation of academic freedom to push faculty to incorporate more exposure to deeper levels of technology in their courses. We did agree that all students should leave the college with a certain level of expertise in using technology so they can function as confident knowledge workers in today's high-tech society. The problem is how to accomplish this goal.

We asked the question, "what should the rubric be used for?" Should it represent guidelines to help students, their advisors (both academic and non-academic), the Dean, the curriculum committee, the mission committee, the strategic plan committees, etc., make plans to help each student reach her IT fluency goals? We agreed that the rubric should serve all the above constituencies. Technology needs to be consciously considered in advising students, in constructing the curriculum, in co-curricular activities, everywhere on campus.

After three major and many minor revisions, we developed the rubric found in Appendix 1. After it was approved, we discovered that a number of items in the rubric (e.g. email, which is listed in the beginning user skill column) have a variety of skill layers, some of which should be listed in the Passive, Active, and even Expert User rows. In some sense the rubric is really three dimensional and we decided to make these multilayered terms hyperlinks to background documents explaining how they apply at each of the user levels. I will demonstrate this on-line in my presentation. [3]

Difficulties with Assessing Fluency

We asked how we should push IT fluency. A single course for all students, perhaps an extension of our four week technology orientation experience that first-year students take now was rejected as not providing continuous "just-in-time" learning and as being very hard to set up and coordinate. Diffusing IT fluency experiences throughout the curriculum, much like writing across the curriculum, is very hard to assess because no one is accountable for making sure the experiences are of high enough quality and that each student avails herself of them sufficiently to achieve a high enough level of fluency. The best home for the assessment of IT fluency seemed to us to lie with the advisors. We asked how the rubric might be used by advisors -- i.e., as a talking point, or as a guideline, or perhaps a promise that if a student reached the fluency level she and her advisor agreed was optimal for her then she would be successful after graduation. It was mentioned that the local technical college actually backs up this promise with free tuition for courses taken after graduation if a student does not succeed in finding a suitable job.

If advisors are to take on the responsibilities mentioned above, they have to know where in the curriculum and in the cocurriculum to find opportunities for their advisees to grow their IT fluency, and there has to be a strong support mechanism in place to help them give good advice. If the rubric is to be really helpful to advisors and students as well as the other constituencies mentioned above, it needs to be simple to use. To accomplish this, we decided to put the rubric in grid form. This will emphasize the fact that no one finds herself totally at a single level in the rubric. At different times and in different settings she can be at one level in information literacy, another in skills, etc.

Student Information Technology Fluency Stages

Our overall goal is to make sure that students are prepared to enter the technologically changing world when they leave the college. They should have become lifelong learners who remain fluent with technology throughout their lives. We believe that this goal can be accomplished through the following four stages::

1. Empower each student to self assess her fluency level in dialog with her advisor and to set goals for herself establishing the level she wants to attain by the time she graduates;

2. Provide the student and her advisor with the knowledge to lay out a plan to reach her goals by inventorying the curricular and cocurricular opportunities available at the college to help her move up the fluency ladder;
3. Provide ways that a student can demonstrate her competence with IT fluency;

4. Provide a recognition system for those who have reached their fluency goals.

There was some disagreement as to whether or not we would have to implement all four stages before getting started. Some saw the learning that would happen as we implemented each stage would help define the next stage's implementation. Others felt that students would not take the program seriously unless we implemented all of the stages. We decided to implement the first two stages for next year (2001-2002) as a pilot project with students from the departments whose faculty become early advisors of students (e.g., Biology, Chemistry, Math, Nursing, perhaps Education and Business) and also some students who would normally be advised by the Office of First Year Studies or the Assistant to the Dean until late in their Sophomore year. We will try to convince advisors of this pilot group to use the rubric as a self assessment tool as described above. Using this pilot experience as a guide, we will then decide whether or not to implement all four stages at once.

It seemed clear that we would have to have in place by fall 2001 at least a beginning inventory of ways students can improve their fluency skills. It was also clear that we will need a support system for advisors as they started working with the rubric with students.

Resource List for Improving Fluency

The second stage in our plan to set up a program for improving fluency was to prepare an IT resource list of courses and extra-curricular opportunities that students can use to improve their IT fluency. Each department liaison was asked to prepare such a list. Student affairs and the residence hall staff helped with the list of co-curricular opportunities.

We brainstormed general categories of resources we will need to gather to help students improve their fluency level. These were:

1. Courses - especially those that require use of a certain technology
2. Workshops - a listing of their content will be necessary
3. Student government positions and committees that use technology
4. Summer jobs involving technology
5. Internships involving technology
6. Student employment involving technology
7. Clubs that produce newsletters and/or maintain web pages
8. Local on-line resources re technology
9. Courses or workshops at other area colleges in our consortia
10. Web on-line universities or tutorials
11. Tutorial software on CDs (e.g. the one for Office 2000)

Survey Form for Faculty

We prepared a survey instrument (Appendix 2) for faculty to complete, listing their lower division courses for the 2001-2002 academic year and how they incorporate different kinds of technology in course assignments. The team working on the co-curricular opportunities prepared a list with a partial set of computer skills which were utilized by students in various student government and student employment positions. (Appendix 3)

As we were discussing the resource list we came to several realizations which are listed as follows:

1. Students will teach each other. It is not necessary for either faculty teaching a course requiring student use of technology or supervisors of student government or employment positions to teach students about technology, but these faculty and supervisors should know where students can go to learn the technology.

2. We are trying to create a culture at Saint Mary's in which students will take responsibility for their own learning, but in the meantime we need a process that will not just expose students to technology, but will insist that they make use of it.

3. A survey form might uncover resources which help improve the technology skill level, but may not get at the information literacy component in the rubric.

4. It is very hard to teach students to evaluate web-based information resources because they do not have the background in the discipline to call upon. It is hard enough for experienced faculty to evaluate these resources. We spent a good portion of time discussing what is reasonable to expect from students in their attempts to evaluate the quality of web-based information without reaching any consensus.

We concluded that the survey instrument we use to gather the resource list should focus on what students are expected to do in the course concerning the growth of their IT fluency, not on the technology the faculty member uses to transmit the course information. For each course or other opportunity, three questions need to be asked:

- What kinds and levels of technology were students required to use in the course or position?
- What specific assignments were they given requiring use of technology?
- What were the learning goals of these assignments?

There was a healthy skepticism expressed that the survey would not uncover resources to help students improve their higher level critical thinking and assessment skills. Because we had a difficult time articulating exactly what we wanted from faculty who were to fill out the survey, we decided that we had better present it to the department liaisons in person at a meeting soon after spring break.

While we were discussing the survey form, a Biology teacher had filled in the grid for one of his courses to illustrate that it might not be as hard for faculty to work with as we might think. In fact, the resources he identified would be very apropos for any liberal arts course. We suggested that each of us take one of our courses and do the same so we would have a set of examples when we talked to the liaisons and they could use them when talking to the faculty in their departments.

The design of the survey form was hindered by the failure to specify the organization of the resource list that we will prepare for students and advisors. We decided to prepare an indexed list of identifiers and descriptions that faculty could use to categorize their course assignments regarding which aspects of IT fluency they enhance. The George Mason report [4] was suggested as a model for identifying categories. This report can be found at www.educause.edu/ir/library/pdf/eqm0041.pdf (specific goals on page 7). We revised this document for our purposes and called it a Glossary of IT Identifiers. (Appendix 4).

Each item in the glossary has an single-letter IT Identifier code which faculty members are to put on the survey form next to the course which incorporates this type of technology in its student assignments. We included a code 'X' which indicates that none of the IT Identifiers apply and the faculty member needs to use the Comment column to explain how the assignment enhances IT fluency. Note that there is a column on the survey form for the faculty member to identify representative assignments using the indicated category of technology. We hope that this column will help us identify the level(s) in the rubric on which we should list the course.

We discussed making the resource list available as links from the rubric, where a course would appear in the block(s) where it helps a student progress down the ladder. (I.e., it would not be listed at a level beyond which its opportunities would take the student, nor would it be listed in earlier levels where it would be too hard for students to master.) This suggestion was met with skepticism from some participants who believed that most resources would be multilayered.

Challenges Encountered in Trying to Set Up the Program

At the liaison meeting we encountered some of the challenges mentioned below, but found that most departments were willing to work with the survey form. At this meeting, we decided to restrict the survey to 100-200 level courses, since these are open to all students. Even if a student found a major course in another discipline which seemed likely to help her improve her IT fluency, it is unlikely that she would have the prerequisites to take it.

A number of faculty felt that they need to improve their IT fluency before they try to help students who might be at a higher fluency level than themselves. One suggestion was for each department to figure out what skills their students need and take care of advising and providing opportunities for improving IT fluency for their own majors. It was pointed out that the IT fluency advisor model we are advocating incorporates the idea that departments would advise their own majors but the advising of undeclared students still needs to have a technology component. This two-tiered model (general education advising followed by advising in the major) is still a problem for liberal arts faculty. It appears that some departments are not clear exactly what level of fluency their graduates will need. Word processing and an active user's level of information literacy seem to be enough. We may have to spell out the minimum level in the rubric that a graduate in a liberal arts discipline must achieve. This is not so much a problem in Math, science, or the professional disciplines.

The problem of advising beginning students in their general education program is being studied as part of the long range strategic plan. There is a recommendation in this plan for significant advisor training. Incorporated in that training would be strategies for helping students self assess their IT fluency level and develop their own plan to reach a target level before graduation.

We agreed that the efforts to improve faculty IT fluency must proceed apace with the effort to help students assess and improve their own fluency. We cannot afford to wait until faculty are fully fluent because the students we teach today must be prepared to enter a technological world.

One of the Science departments questioned the need for this effort. They have found that students they encounter, both majors and general education students (Saint Mary's has a one-year Science requirement of all students), are already sufficiently fluent in information technology to be successful after graduation. This department recommended that we survey the graduating seniors before doing unnecessary work. The end-of-semester crunch has made it impossible to prepare and administer such a survey. Perhaps we can assess the fluency level of the incoming first-year students and reconsider the fluency program on the basis of this assessment.

Conclusion

This report has outlined the approach to IT fluency assessment taken at Saint Mary's over the past year. It has detailed the insights and problems we encountered along the way and includes the documents we produced. Although we have had to scale back our plans several time, we still intend to spend time with each incoming student in the first few weeks next fall, helping them work through the rubric as part of their four-week introduction-to- technology course. We intend to make this information available to their academic advisors, along with the resource list we prepare over the summer from the faculty survey results, and to reassess the program after the intro course is completed.

In the present political environment at the college, we must make sure that we do not raise any faculty fears by appearing to act without proper clearance. One fear would be that we are trying to impose the rubric and the counseling of students in its use on the departments. It is not clear whether the rubric and its supporting documents should go through the curriculum committee. We could probably offer to submit it, but, since there is no credit or graduation requirement associated with the rubric at the current time, the curriculum committee would probably decide that approval of the rubric is outside its jurisdiction.

Other schools (e.g., George Mason University) have taken a much more agressive approach to the fluency problem. They have implemented Technology Across the Curriculum initiatives. We are hopeful that our low-key approach using student self-assessment and encouraging advisors to help students set and reach fluency goals, will achieve our stated goals. We understand that faculty may not be able to function effectively as advisors without explicit guidelines for using the rubric. We hope that these guidelines arise from our experience next fall.

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Appendix 1

Grid for the Student IT Fluency Rubric

Ladder Rungs	Skill Level	Concept Grasp	Information Literacy Level	Performance Level
Beginning User	Reasonable reading and typing skills; can use email and simple web access.	General awareness of importance of technology in society, but little specific knowledge of computers or how to use them for modeling or information access.	Little experience with information retrieval or evaluation.	Successful at following simple instructions when using technology.
Passive User	Can use word processing, library catalog and periodical indices; can get a newly purchased Personal Computer up and running and connect it to an Internet Service Provider; can use operating system features (E.g. Windows desktop).	Understand the societal impact and limitations of technology, basically how computers work, how the internet works, and how information can be stored and retrieved.	Comfortable with navigating information structures, but not aware of the need to evaluate sources.	Uses technology in the learning process (e.g., on-line tutorials, web resources, discussion boards, email communication and list serves, course info, etc.)
Active User	Can use application software which has a user friendly interface (e.g. presentation software, spreadsheets, databases); can develop web pages with editor (e.g. DreamWeaver); can use graphics packages to create web illustrations as long as no programming is involved; has acquired basic technology skills appropriate to one's discipline.	Understands the specifics of how IT is used in one's major discipline and in general how it is used in other disciplines.	Can navigate and evaluate information using a variety of sources, formats, and media, and use it in research and problem solving.	Has posed and answered research questions via technology.
Expert User	Has high communication skills; able to learn to use a new piece of software without help; knows how to write programs in at least one language (e.g. HTML); has mastered the advanced skills needed to use technology in one's major discipline.	Thinks about technology on an abstract level; understands the underpinnings of networking, algorithmic thinking, object-oriented programming, system development.	Possesses an understanding of information at the active user level as well as the economic, legal, and social issues surrounding the use of information.	Is a confident problem-solver and thinks abstractly about technology; can present a workshop relating to technology.

IT Fluency Rubric -- Revised 3/7/01

Appendix 2
Survey Form

Name ____________________________

Department_______________________

Semester _________________________

Course Name	Course Number	IT Identifier Code	Representative Assignment	Comment

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Appendix 3

IT Fluency Task Force	
Position	**Computer Skill Used**
President, Student Diversity Board	Adobe Photshop, Set up listserv, Word, Excel
Technology Com.	Photoshop, Dreamweaver, Flash, MS Visual Studio, Office, Acrobat
Student Activities Board	Website→ Adobe, Photoshop Publicity → Various Packages, Word, Excel, listservs
Secretary/Yearbook Managing Editor	Page Maker, Dreamweaver, photoshop, MS Office
Student Academic Council	Excel, Word (MS Office), not sure from publicity-will ask.
Student Body President	Excel, Word, Adobe Page Mill, Photo Shop
Treasurer	Excel, Word, Power Point, Pagemaker
Elections	Word, E-mail (e.g., to facilitate abroad-student voting)
Campus Communications Commissioner	Microsoft Newsletter Wizard
Residence Hall Association	ClipArt Gallery, Corel Printhouse, Explorer and Netscape, Excel, Microsoft Publisher, MSAccess, Powerpoint, Microsoft Creative Writer, ClarisWorks, Printshop
Student Newspaper	Use of MAC computers, Quark page design/ layout/publishing, photoshop.
Student Judicial Board	Word, Excel, list serv.
Class of 2003 Officers	PageMaker 6.5, Photoshop 6.0
Class of 2002 Officers	Word, e-mail
Counseling & Career Development Center	Adobe Pagemill, Pagemaker & Acrobat, JobDirect System (an on-line database of companies & jobs/internships). Alumnae Resource Network, Word Perfect, Word, MS Access, PowerPoint, Netscape & Internet Explorer, e-mail.
Athletics	Word, Wordperfect, Excel, Photo Shop, Newsletter wizard, Adobe, pagemill, NCAA Stat programs, Microsoft Greetings

Appendix 4

Glossary of IT Identifiers

The following list of categories was adapted from a report by Dee Ann Holisky, Associate Dean for Academic Programs, College of Arts and Sciences, George Mason University. Each category has a wide range of complexity from elementary to advanced skills. If your course incorporates one or more of the categories at any level, please write the category letter in the correct column of the response form and briefly describe a representative course assignment that illustrates student accomplishment in that category. If no category applies, but your course does help students become more fluent with technology, put an X in the Category column and describe the technology component in the comments column. Note that we are asking you to enter a course on the survey form if it includes at least one of the descriptors in a category.

There are a couple of quotes from the introduction of Holinsky's report that help set the stage for our efforts. George Mason has a Technology Across the Curriculum (TAC) program which tracks where technology is incorporated into the curriculum. Although Saint Mary's has no formal TAC program, the TLTR is attempting to develop an informal data base of educational experiences which will help students improve their IT fluency and meet the fluency goals they are setting for themselves.

"Because we are not a training school, but an institution of higher education, the focus of this program is not on the teaching of technology skills or software packages, per se, but on identifying and developing those information technology skills that will enhance the learning objectives of specific courses. ... Moreover, as valuable as the skills identified below are, we believe that our most important job vis a vis IT is to develop in our students a conceptual understanding. It is this understanding which will best prepare them for a future in which the only certain thing is rapid technology change.

"Finally, though a list presents technology skills as discrete and unconnected, the ultimate goal is to help our students to integrate these skills. When confronted by complex problems, they should be able to choose the most appropriate technology tools to solve them." [1]

A. Engaging in *electronic collaboration.*

This means using email (with file attachments) and listserves, understanding interaction between different modes of electronic communication, collecting material from a variety of electronic sources into a single document, collaborative writing, completion of a complicated group project, and understanding issues in the sharing of knowledge.

B. Using and creating *structured electronic documents.*

This means word processing (formatting and editing text, templates, styles, mail merge), web authoring using an editor (e.g. Dreamweaver) and understanding the uses of hypertext. It could mean knowledge of desktop publishing, image composition, advanced graphics, HTML, SGML, XML, electronic document structure, platform-independent programming, Web site management, server-side scripting.

C. Student *technology-enhanced presentations.*

This means employing basic Web skills as above or using basic features of presentation software, smooth use of technology and adaptation of technology design and display to audience. It could mean using high-end features of presentation software packages (custom templates, animation effects, multimedia, exporting); linking to other programs (e.g. spreadsheet); insertion of web links and management of real-time web access during presentations, video production.

D. Using appropriate electronic tools for *research and evaluation.*

This means developing appropriate search strategies (appropriate keywords, topics, resources), conducting Web searches, using different searching techniques (e.g. Boolean), evaluating sources using citations and abstracts, using on-line catalogs, news outlets, digital archives, conducting Web site evaluation, using bibliographic databases and standards, using discipline-specific databases and information services (JSTOR).

E. Using *spreadsheets* to manage information.

This means organizing data in worksheets (formatting ranges, columns, rows; multiple worksheets), formulas, column totals, lock columns, absolute/relative cell addressing, import/export data, simple graphing (pie chart, line graph, histogram, labels), understanding appropriate applications of spreadsheets. It could mean using macros, pivot tables, filters, statistical functions, logical functions, Visual Basic programming, interfacing with other applications.

F. Using *databases* to manage information.

This means setting up tables (define fields, add labels), editing records, conducting queries (sort/filter data), constructing forms or reports, understanding appropriate applications of databases. It could mean defining relationships between tables, creating complex queries, producing advanced multi-level reports, doing advanced forms, Visual Basic macros, basic SQL programming, and knowledge of data base management systems.

G. Using electronic tools for *analyzing quantitative and qualitative data.*

This means data entry and definition (read and describe variables and values; data verification or quality control), format output, source code control, reliability, validity, missing value analysis, descriptive statistics, plotting and graphing (pie chart, histogram, linear, scatter plot), formulating problems with an understanding of the relevant mathematical concepts. It could mean being able to use advanced statistical techniques and simulation theory.

H. Familiarity with major *legal, ethical, and security issues* in information technology.

This means familiarity with privacy issues, copyright and liabilities, netiquette, hacking, hoaxes and rogue programs (viruses, worms, Trojan Horses), open source versus proprietary standards.

I. Working knowledge of *IT platforms*.

This means familiarity with hardware, software installation, troubleshooting, operating systems (Windows, Mac OS, UNIX, VMS), browser-based graphical user interfaces, networks, file storage and directory structures.

J. Familiarity with the *societal impact and limitations of technology*

This means familiarity with the role knowledge workers play in society, knowing when and when not to use technology to tackle a social problem.

K. Proficiency using discipline specific technology.

Several disciplines have specific technology requirements different from the ones mentioned above. Students in these disciplines need to learn how to use these technologies and to interpret the results correctly.

X. Category not included above.

[1] "Information Technology Goals for Liberal Arts Students" by Ann Holisky, Associate Dean for Academic Programs, College of Arts and Sciences, George Mason University, http://cas.gmu.edu/tac/docs/it_goals.html

Creating a fully-functional stand-alone web development system that includes web and database servers

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Abstract

There are times when it is useful to be able to develop and test a web-based system that includes server-side web and database processing without being connected to the Internet. This paper/talk will discuss/show how to create a fully-functional stand-alone web development system on a laptop computer that includes the following: Microsoft Internet Explorer, FrontPage, Personal Web Server supporting Active Server Pages, and Access or SQL Server database system accessed via ActiveX Data Objects. The required background in TCP/IP will be included as will the necessary steps to acquiring, installing, and configuring the various components. The author uses such a system for classroom presentations, which works even if the local network and/or Internet is not working in the classroom.

Introduction

In 1995, the author started using static HTML pages on a stand-alone computer and publishing them to the Internet for students. In 1997, the author started using JavaScript in to add client-side processing to the web system. Early in 2000, the author started using Personal Web Server (free with Windows 98) and Active Server Pages to add server-side processing to the web system. By the end of 2000, the author had begun integrating database access via SQL Server into the web system.

The web system on the web server that your audience sees is the production system. In the case of a professor, one audience might be students in the classes that the professor is teaching. In the case of a business, the primary audience might be customers who purchase items from the business. However, it is not good to directly develop content on the production system, for a number of reasons all of which are somewhat related.

- You might make a mistake, either in content or in format, that could have serious consequences, especially if security is inadvertently modified.
- You might want a backup for the production system, in case you make an unintended change.
- You might change your mind. While making changes, the web system is left in a quasi-stable state.

For these and other similar reasons, it is best to develop web content off-line and then, when ready, publish that content from the development environment to the production environment.

Of course, there are times when the development server might need to function as a production server. For example, one time during Fall 2000, the author had students in a lab session connect to the author's laptop-based web development environment in order to get the lab assignment and to submit assignments electronically in lieu of using the University web system, which was down. The lab went on as usual, a result of both having a development environment and being able to make that environment available when the need arose.

The rest of this paper is a brief introduction of how such a development environment might be created.

Relocatable web systems

The most important design consideration for a dual development web system mirrored to a production web system is that the web system must be fully relocatable. This means the following.

- All links that refer to files within the web system must be relocatable file references and not absolute http: references.
- All pages with embedded server-side processing code must distinguish which web server the page is on and take appropriate action.

If these conditions are met, then it is a simple file copy, or FTP update, or HTTP update, from development to production system.

Basic Internet capability

A development environment can be created on any sufficiently powerful computer with the appropriate software, etc. It is assumed that the reader has used the Internet and has Internet access and capability and ability on the intended production and development environments to consist of the following capabilities.

- The development environment has a TCP/IP connection to the Internet (or intranet, if that is where the production server is located) via some ISP (Internet Service Provider). The reader knows how to access the Internet from the development environment.
- The development environment has a web browser connected to the Internet. The reader knows how to use a web browser.
- The development environment has software that can be used to create web pages. The reader knows how to use that software to create web pages and publish them to either the development or production server.
- An email connection that can be used to send and receive mail is on the development environment. The reader knows how to use email to send and receive messages. The development environment discussed only sends mail, but this capability must be provided via SMTP (Simple Mail Transfer Protocol) by the ISP. For this to be of use the production web system, the production web sever must support outgoing email capability. If not, this capability can be added to the production environment in the same way as to the

development environment.

Although the general discussion that follows applies to any platform, for the purposes of this paper, the specific discussion applies to a platform that consists of the following.

- The operating system of the development and production web systems is Microsoft Windows 95/98/Me/NT/2000. Important differences between 95/98/Me and NT/2000 will be mentioned, where appropriate, although the paper is written towards a Windows 98 platform, the platform currently used for the development system.
- The web browser is MSIE (Microsoft Internet Explorer) 4.x, 5.x, etc., or some similar web browser used to access the WWW (World Wide Web).
- The system used to develop web pages is Microsoft FrontPage, Macromedia Dreamweaver, or some similar software to create web pages.

For the development environment discussed, the platform consists of the following.

- Microsoft Windows 98 running on a laptop computer. Because Windows 98 is not as secure an environment, it can often be moved into and between Windows 2000 environments easier than can a Windows 2000 laptop.
- Microsoft PWS (Personal Web Server) or personal IIS (Internet Information Server), free from Microsoft and/or included with Windows 98/Me/NT/2000. The production web server should be running full IIS. Note that Personal IIS on Windows 2000 includes SMTP and FTP capability, but that capability is not discussed here.
- Microsoft SQL Server 7 or 2000, free 120-day trial available from Microsoft or with selected textbooks, no time limit on the Developer edition, if you have it as part of a MSDN (Microsoft Developer Network) subscription.
- Persits ASPemail component, free for noncommercial use. The full version has some added features, but the free version is very useful for most purposes. For space reasons, this topic is not discussed further in this paper.
- Command-line FTP (File Transfer Program), included with Microsoft Windows, or update via http: using Microsoft FrontPage and web server FrontPage support. Updating the web site is not discussed further in this paper.

Finally, each of the many topics discussed in this paper can fill a large-sized book. Thus, only the briefest examples will be given on how to actually use the capability provided by each system. Instead, the needed information for installing and setting up each system is the primary focus. Some references used by the author to install and setup each system have been included at the end of this paper. In addition, web searches are very useful in finding tips on using each of the described software systems.

TCP/IP

TCP/IP is the protocol of the Internet and any intranet that you might be using. The use of PWS as web server and SQL Server as database server require that TCP/IP be installed and that you know the name of the development computer and be able to determine your IP Address. The standard intranet IP addresses are as follows.

10.x.x.x (class A)
172.16.x.x (class B)
192.168.1.x (class C)

These addresses cannot be part of the Internet but may be connected through a router that uses NAT (Network Address Translation).

One way to determine the IP address, and other TCP/IP settings on the computer, go to the command line (one way is to select "**Start**", "**Run**", type "**command**", and press Enter. Then, type the command

```
ipconfig /ALL
```

and press Enter. Another way, on Windows 95/98/Me, is to select "**Start**", "**Run**", type **winipcfg.exe**, and press Enter.

One way to determine and/or set the name of a computer, is to select "**Start**", "**Settings**", "**Control Panel**", "**Network**". The "**Network**" dialog box appears. Select the "**Identification**" tab. Under "**Computer name:**", you can set the name of the computer which is, in this case, **rmsnyder**. All computers that wish to share files need to have the same "**Workgroup**:" name. The default workgroup name is **WORKGROUP**, although the author has found that it is best to name the home network workgroup the same as the work network workgroup name. Currently, that workgroup is **WIN**. Otherwise, one must constantly change the workgroup name and either reboot or logoff and log back in order to change workgroup names.

HTTP protocol

To understand what is happening during a web transaction, one must understand the basic http: protocol. A typical web page transaction goes as follows.

- The client initiates the transaction by opening a connection to the server and requesting a web page from a server.
- The server receives the request, processes the request, often via server-side processing involving database access, sends a response, and closes the connection.
- The client receives the response, formats the response, and displays it to the user.

This protocol is stateless in that no memory is kept of previous transactions with this client. To remember previous client transactions, the concept of cookies were introduced, with all the inherent and well-publicized advantages and disadvantages.

Client-side versus server-side processing

Web pages consist of text files in a particular format. Static HTML (Hypertext Markup Language) pages, except for perhaps an animated .gif file, have a file extension of .htm (or .html) and consist of plain HTML that is formatted and displayed by the client browser.

Client-side processing involves a client-side scripting language, such as JavaScript, that allows dynamic content to be displayed by the browser at the client computer. The primary problems with client-side scripting languages are as follows.

- There is no protection of source-code from prying eyes.
- The client-side scripting code must account for variations in a large number of possible client browsers.

Because of these problems, most client-side processing is done with the fairly portable JavaScript using a small subset of the capabilities of the language, again for portability reasons.

Server side processing was developed both to solve some of the problems with client-side processing and to provide support for e-commerce and other applications requiring server-side database access. It is a major security problem to allow the client to directly access the database. Thus, the web server acts as a go-between between the client browser and the database server. A common form of server-side processing is Microsoft Active Server Pages.

Microsoft ASP (see, for example, [2], [10]) is a application framework for adding server-side processing to web pages. Although in theory any scripting language can be used that has been adapted to this framework, in practice VBScript, a subset of Visual Basic and using Visual Basic syntax, is most often used. Other alternatives, not as well supported, include Microsoft JScript (a version of JavaScript) and PERL.

To see how ASP works, consider the following HTML that, when formatted, displays three numbered successive lines of "**Hello, World**" text.

```
<HTML>
<HEAD>
</HEAD>
<BODY>
<BR> 1. Hello, World
<BR> 2. Hello, World
<BR> 3. Hello, World
</BODY>
</HTML>
```

The output on the screen would appear as follows.

1. Hello, World
2. Hello, World
3. Hello, World

The following ASP file, when formatted, sends the same HTML to the client browser.

```
<%@ LANGUAGE="VBSCRIPT" %>
<HTML>
<HEAD>
</HEAD>
<BODY>
<% Dim i %>
<% For i = 1 To 3 %>
  <BR><%= i %>. Hello, World
```

```
<% Next %>
</BODY>
</HTML>
```

Note the following.

- The ASP language used is "VBScript".
- Each ASP statement starts with a "<%" and ends with a "%>".
- Variable i, declared using a Dim statement is used in a For loop from 1 to 3 to output successive lines.
- An expression to be output, such as i, can be placed between a "<%=" and a "%>".

It should be obvious that ASP provides considerable flexibility is dynamically creating web pages. In addition, ASP scripts have access to any ActiveX/OLE/COM object that is available on the web server. One such useful component is the ADO (ActiveX Data Objects) component, used by ASP pages to access database servers such as SQL Server.

When using web page creation software such as FrontPage to develop static HTML pages or HTML pages with client-side processing, a "**Preview**" page shows what the page will look like. Unfortunately, if server-side processing is used, the "**Preview**" page is not very useful as a web server is needed to see the effect of the server-side processing. To see a change to the web system, one must save the page, switch to the web browser, and reload the page from the web server so that server-side processing is performed on the page. Microsoft Personal Web Server can be used as such a web server.

Personal Web Server

PWS (see, for example, [1], [9]) is not intended for production web server use since it handles only a low volume of transactions at any one time and by only a few concurrent users. In addition, secure web communication using SSL (Secure Sockets Layer) protocol using https: is not supported. Nevertheless, PWS can be very useful for getting a web server up and running and for testing a web site before publishing the web site to a production web server. PWS is included free with Windows 98/Me/NT/2000, and can be downloaded as part of the NT Option Pack (yes, that is what you need) for Windows 95. The method for installing PWS for Windows 98 is as follows. The other platforms are similar.

- Select "**Start**", "**Settings**", "**Control Panel**". The "**Control Panel**" dialog box appears.
- Select "**Add/Remove Programs**". The "**Add/Remove Programs Properties**" dialog box appears.
- Select the "**Windows Setup**" tab. The "**Windows Setup**" dialog box appears saying "**Please wait while Setup searches for installed components...**". You may have to wait 20 or 30 seconds.
- Under "Components", select "**Internet Tools**".
- Select "**Details**". The "**Internet Tools**" dialog box appears.
- Select "**Personal Web Server**", "**OK**". Follow the instructions.

If you wish to see the official installation instructions, select "**Start**", "**Programs**", "**Internet Explorer**" (the folder, not the program shortcut), "**Personal Web Server**". A web page is opened with installation instructions.

In my case, the "**Transaction Server**" did not fully install, but that did not seem to cause any problems. I am not sure why it did not install. It is required for IIS on NT/2000, but is not required for PWS, although the PWS setup will not let you install without trying to install it.

Once installed, you can access the settings from the icon in the tray. If PWS is not in the tray, you need to find the icon to start PSW and select "**Properties**" "**Show Tray Icon**". The "**Personal Web Manager**" dialog box appears. The "**View**" options of "**Personal Web Manager**" are as follows.

- The "**Main**" view is used to "**Start**" and "**Stop**" PSW and to display settings and statistics.
- The "**Publish**" view is used to quickly publish a web page that is available on your web site via PWS. We will be using FrontPage, so we will not be using this view.
- We will not need the "**Web Site**" view as we will be using FrontPage.
- The "**Tour**" view provides a tour of the capabilities of PWS.
- The "**Advanced**" view is used to set properties that determine where your web site is located on your hard drive.

The "**Publish**" and "**Tour**" options are pretty useless. But, before starting PWS, you should specify the virtual directory mappings to the local hard drive under the "Advanced" view.

- Under "**Directory:**", specify the directory on the local hard drive where your web site is to be placed. Note that a lot of subdirectories will be created here, so you might not want to specify a directory that contains other files.
- Under "**Alias:**", you can create an alias name for this directory, except for the "**<Home>**" directory.
- Access can be "**Read**", "**Execute**", and/or "**Scripts**". Usually, your web site that everyone can access is "**Read**" and "**Scripts**". Scripts can call programs on your hard drive in directories that should be set to "**Execute**".
- When done, select "**OK**".

Directories

A virtual directory is a directory that is specified relative to some fixed directory, while a physical directory is specified using an absolute path. For example, the first several virtual directories after a default install of PWS are as follows.

```
<Home>
 /_private
 /_vti_bin
    /_vti_adm
    /_vti_aut
 /_vti_cnf
```

Specifying the root directory on the local hard drive as D:\G maps the above virtual directories to the following physical directories.

```
D:\G
 D:\G:\_private
 D:\G:\_vti_bin
    D:\G:\_vri_bin\_vti_adm
    D:\G:\_vri_bin\_vti_aut
 D:\G:\_vti_cnf
```

Note that the virtual directories use the forward slash "/" while the Windows directories use the backslash "\". If your home page is available at http://rmsnyder, then the above virtual directories map to the following Internet directories.

```
http://rmsnyder/
 http://rmsnyder/_private
 http://rmsnyder/_vti_bin
    http://rmsnyder/_vri_bin/_vti_adm
    http://rmsnyder/_vri_bin/_vti_aut
 http://rmsnyder/_vti_cnf
```

Notice that while there is only one virtual directory, there may be more than one physical directory. The home page location of **http://rmsnyder** is used because, in this case, the computer name is **rmsnyder.**

The location **http://rmsnyder** will work on an intranet running Windows and TCP/IP where both computers have the same workgroup name. On the Internet, however, you would need a valid domain name that maps to the IP address of your computer. This IP address would have to be a fixed IP address and not a dynamic IP address as used in many institutional and ISP environments. If one computer had an Internet IP address of 123.45.67.89, then another computer on the Internet could access the first computer using **http://123.45.67.89**. If the user legally registered the domain name **mywebsite.com** and had a fixed IP address, then a DNS (Domain Name System) server would be able to translate the name **mywebsite.com** to the proper IP address.

For example, on the author's laptop, the computer name is **rmsnyder**, the virtual directory name is **W**, the physical directory location is **D:\W**, and the default home page in the browser is set to **http:\\rmsnyder\W**. Since the default web page is **default.asp**, the physical default web page is **D:\W\default.asp**.

Advanced options

Under "**Advanced options**", check the box for "**Enable Default Document**". The "**Default Document(s):**" should be set to **Default.htm,Default.asp** so that the first one of these found in this directory will be the one loaded, if no file is otherwise specified.

Insure that the check box for "**Allow Directory Browsing**" is not checked. Allowing users to browse directories can make it easier for an intruder to breach the security of your web site, so do not check this box. Prohibiting directory browsing is like granting "**Read**" access but not "**File Scan**" access to a directory. Thus, a viewer can read any file desired in a directory, but cannot perform a directory listing to see what files are there. Thus, one has to know beforehand what the file name is. This is the case with web page systems. All files that you want someone to access can be accessed from the main web page.

If you wish to keep an activity log, which is a good idea unless you have a reason not to do so, then check the box for "**Save Web Site Activity Log**". Of course, if you will not look at the activity log, it will just take up space on the hard drive.

Once your directories are specified, you can return to the "**Main**" view and "**Start**" or "**Stop**" your web site. Click the "**Start**" button to make your web site available. Of course, you must be connected to the Internet or an intranet via a valid TCP/IP connection for others to see your PWS web site. The "**Start**" button turns into a "**Stop**" button.

Click the "**Stop**" button to make your web site available. The "**Stop**" button turns into a "**Start**" button. To see your web site via Internet Explorer, type the URL of your web site into the "**Address**" field and press Enter. If you now switch to Personal Web Server and "**Stop**" the web server and then switch to Internet Explore and "**Refresh**" the web page, you will no longer be able to access the web page since the web server has been stopped.

Database capability via SQL Server

The use of Microsoft SQL Server could easily fill several huge books (see, for example, [3], [4]). For the most part, SQL Server 2000 has a few improvements over SQL Server 7 (which was a big improvement to SQL Server 6.5), but for the most part, the setup and use of each is similar. A few comments and tips will be provided here to provide the big picture of what can be done and how to go about doing it.

Even if one desires database access, one should first determine if one actually needs to install SQL Server locally. If one has access to a production SQL Server and one is content to use it only when on the local intranet, then one does not need SQL Server on the development environment. Otherwise, there are many 120 day licenses for SQL Server available from various sources. If one has access to the developer edition of SQL Server (e.g., via an MSDN subscription), then there is no time limitation. The practical limitations on the developer edition are not important for development work.

Installing SQL Server from the CD is not very hard. For Windows 95/98, there is only one way to install SQL Server. The other ways are simply not allowed, but you have to chose the other ways before being told that they will not work. So, just follow the instructions. TCP/IP should already be installed on the computer. After installation, in both the "**Client Network Utility**" and the "**Server Network Utility**", the author has found it useful to remove every connection method that you are allowed to remove except for TCP/IP. That is the only way that the author could get a computer on an intranet to see the development version of SQL Server on another computer on the intranet. Otherwise, use the default options for everything.

You want to make sure that you have the latest version of the MDAC (Microsoft Data Access Components). As of Sat, Feb 24, 2001, the "**Microsoft Data Access Components (MDAC) 2.5 RTM (2.50.4403.12) Download Page**" was at **http://www.microsoft.com/data/download_250rtm.htm**. Note: Version 2.6 was available, but had some disclaimers about not supporting certain features of SQL Server 7. After downloading, just run the executable to install the updated drivers and components.

There are several client tools that are useful in developing and testing databases.

- Enterprise Manager is used to **interactively** develop and test the configuration of databases on SQL Server.
- Query Analyzer is used as a simple IDE (Integrated Development Environment) to work with text files containing SQL and T-SQL code in text editor **batch mode** to develop and test the configuration of databases on SQL Server.

The advantage of interactive mode provided by Enterprise Manager is that it is interactive. The advantage of batch mode in Query Analyzer is that one can fairly easily test complex queries and stored procedures.

For a laptop whose computer name is **rmsnyder**, the SQL Server is referred to as **rmsnyder**, or **RMSNYDER** as the computer name is not case sensitive.

Microsoft Access can always be used on the development environment, but there are limitations and differences that can cause problems when attempting to use the same code to access both Access and/or SQL Server. In addition, Microsoft Access is very limited in its performance and capability compared to SQL Server.

One way to use Microsoft Access to get started is as follows.

- Create the database using Microsoft Access
- Split the Access database into data (tables) and code (queries, forms, reports, macros, modules).
- Attach the data to the code part of the Access database.
- Use the upsizing wizard to upsize the tables of the Access database to SQL Server.
- Attach the SQL Server tables to the code part of the Access database. The data part of the Access database is no longer used.
- Using the code part of the Access database (e.g., forms, reports, macros, modules) now updates the SQL Server tables.
- A web interface can now be created to the SQL Server tables, without losing the functionality provided by the already developed Access code.

When connecting to the SQL Server database, always use the DSN-less connection method and, wherever possible, use the OLEDB connection method rather than the older ODBC method. Since connecting to the database can be one of the most frustrating aspects of using a database from an ASP page, here is the ASP code to connect to the Test database on the RMSNYDER SQL Server using user id **Test** with password **Test**. The only output of this code is that the ADO version of the MDAC is displayed.

```
<% Dim connect1 ' ADO connection object %>
<% Set connect1 = Server.CreateObject("ADODB.Connection") %>
<% connect1.Provider = "SQLOLEDB" %>
<% connect1.ConnectionString = _
 "DATA SOURCE=RMSNYDER;DATABASE=Test;USER  ID=Test;PASSWORD=Test;" %>
<% connect1.Mode = 3 ' 3=adModeReadWrite %>
<% connect1.ConnectionTimeout = 10 ' 10 seconds %>
<% connect1.Open %>
```

```
The ADO version is <%= Connect1.Version %>.

        <% connect1.Close %>
        <% Set connect1 = Nothing %>
```

Note that for this code to work, the **RMSNYDER** SQL Server must be up and running, the database **Test** must exist, there must be a user **Test** with password **Test** who can access this database. Also note that, for simplicity, no error handling code is included. If it were, a nonzero value for **Err.Number** after **CreateObject** and after **Open** should be checked and appropriate action taken if the command did not succeed. Also, the connection should always be opened and closed on the same page and the connection object set to **Nothing** to reclaim both the connect and the memory used by the connection.

For comparison, here is the ASP code to connect to a Microsoft Access database **D:\W\ASP.MDB\test-01.mdb.**

```
<% Dim connect1 ' ADO connection object %>
<% Set connect1 = Server.CreateObject("ADODB.Connection") %>
<% connect1.Provider = "Microsoft.Jet.OLEDB.4.0" %>
<% connect1.ConnectionString = _
 "Data Source=" & Server.MapPath("../ASP.MDB") & "/test-01.mdb" %>
<% connect1.Mode = 3 ' 3=adModeReadWrite %>
<% connect1.ConnectionTimeout = 10 ' 10 seconds %>
<% connect1.Open %>
The ADO version is <%= Connect1.Version %>.
<% connect1.Close %>
<% Set connect1 = Nothing %>
```

Note that the absolute path to the database from the web server point of view is obtained via the **Server.MapPath** function to the ASP page and then a relative file reference to the directory containing the database.

Summary

This paper has covered a brief introduction of how to set up a fully functional web development system that includes both web server and database server.

References

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Computer and information security considerations for installing and running Microsoft Internet Information Server and Microsoft SQL Server

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Abstract

Computer and information security is becoming an increasingly important problem in a society that is becoming more and more dependent on information systems and computer technology. In any system, security is only as good as the weakest link, and most web-based systems have many weak links. And since computer and information security is a continuing process rather than a one and done product, one can never learn too much about the topic. This paper/talk will discuss/present an introduction to computer and information security with particular emphasis on security considerations for installing and running Microsoft Internet Information Server and SQL Server in a web environment.

Introduction

As computer and information security is becoming increasingly important, it is no surprise that the area of computer and information security is a huge field. There are many books on the subject. A good survey can be found in [6] while an entertaining history of cryptography can be found in [8]. For fairly current information in a cookbook format, the book "Hacking Exposed" [4] is an invaluable and interesting reference. For example, one is usually taught that it is easy to monitor traffic on a unswitched Ethernet network as all messages are broadcast to any computer that wants to listen while a switched Ethernet network only sends messages to the intended recipient computers. Thus, a switched network is much more secure than an unswitched network. But, the book provides detailed instructions are provided for how to monitor traffic on a switched network [4, p. 443-456]. Of course, you need access to at least one line or station on that switched network, but if you are under the illusion that such a network is inherently safe, you might be susceptible to such an attack.

Even more recent information can be found by doing a web search and/or getting on a mailing list. InfoWorld publishes free email newsletters on various subjects. See http://www.iwsubscribe.com/newsletters/ for more information. The "**Security Watch**" newsletter has current and important information on security. As the InfoWorld site advertises, "***If your network's not secure, you're toast. Get practical advice on how to run a tight ship with InfoWorld's security guru P.J. Connolly, in this hands-on, technically oriented weekly column.***" (as of 4/10/2001). There are also numerous web sites created and maintained by hackers for hackers, to quickly disseminate the latest techniques. The problem is made worse by the fact that the Internet crosses international boundaries. Thus, even if there are applicable laws in your country, those laws may not apply in other countries. And, one countries villain may be another countries hero. In a global community, you can be attacked electronically from anywhere.

The fundamental assumption in information systems and computer technology security is that a potential adversary has access to all published information. The logical consequence of using this assumption as basis for systems design criteria is that everyone should only have access to information that they need to do their job. This is much easier to do in a closed system, such as an intranet, than it is in an open system, such as the Internet. On the Internet, every adversary not only has access to your system, but has access to a wealth of published information of which you might not even be aware.

Use effective measures that are easy to do

There is no such thing as absolute security, as long as people have access to the computers and/or information that needs to be secure. Think about it. If the White House, FBI, NSA, etc., can't do it, can you? On the other hand, you do want some security. And, since a system is only as secure as its weakest link, and you often do not know what that weakest link is, the cost of approaching maximum security can be prohibitive. The middle ground is that you should get and use the security for which you are willing to pay the cost.

When connected to the Internet, every hacker in the world has access to trying to break your security. Many hackers, like thieves, go looking for easy places to break into. So, as a minimum, you should do everything that is easy to do from a security point of view.

One of the easiest things to do to avoid security problems is to always have the most recent software fixes installed on your production servers and client machines. For Windows platform client machines, one should check the "**Windows Update**" site often for updates. One way to do this is as follows.

- From Internet Explorer, select "**Tools**", "**Windows Update**".
- Select "**Product Updates**".
- Follow the instructions.

I prefer not to have the overhead and inconvenience of the "**Windows Critical Update Notification**" update, so I do not install that feature, but I do try to check it at least once a week or when I hear news of a security problem involving Microsoft. The critical updates often involve some new way that someone has found to compromise the security of Internet Explorer.

A commonly used production web platform consists of Microsoft IIS (Internet Information Server) as a web server and Microsoft SQL Server as a database server, although it is possible to use them together as a development system in addition to a production system [9]. It is fairly easy to install and configure each into a usable web system. It is quite another matter to make sure that the web system is secure. For servers, one should check for updates to IIS, SQL Server, etc., especially those updates that relate to security. Here are some relevant links.

- The primary Microsoft Windows update page is at http://www.microsoft.com/windows/default.asp.
- The primary SQL Server update page is at http://www.microsoft.com/sql/downloads/default.htm. For example, the most recent service pack for SQL Server 7 is SP3, which can be downloaded from http://www.microsoft.com/sql/downloads/sp3.htm (37.5 MB).
- The primary update page for IIS 4, for example, is at http://www.microsoft.com/ntserver/all/downloads.asp, as part of the NT 4 Server update page.

Of course, the Microsoft site seems to change often, so you might have to hunt for what you want, but the search engine makes it fairly easy to find things. Other platforms will have similar sites.

An example of something that is hard to do is to protect a web server from a Dos (Denial of Service) attack whereby a hacker, or group of hackers, makes a huge number of requests to a web server, thus keeping it busy so that it can do little or no useful work.

The human factor

In 1993, Bruce Schneier wrote the first edition of a best-selling book entitled "**Applied Cryptography**" [5] in which described the mathematical basis for cryptography and provided source code that many a programmer has used to create secure systems. When he started consulting for companies, he began to how woefully inadequate that book was in terms of the human factor of security. One colleague told him that "the world was full of bad security systems designed by people who had read Applied Cryptography.". [6, p. xii]. Observing that cryptography is a branch of mathematics while security involves people and digital security involves complex, buggy computers, Schneier went on to write "**Secrets & lies: digital security in a networked world**", a must-read for anyone interested in security as opposed to cryptography. As he states, "If you think technology can solve your security problems, then you don't understand the problems and you don't understand the technology. ... in order to understand the security of a system, you need to look at the entire system - and not at any particular technology." [6, p. xii-xiii].

In particular, "Security is a process, not a product." [6, p. 84]. Security involves the human factor and is only as strong as the weakest link. A common example is the use of password protected resources. The strongest cryptography will not help if a user compromises their password. The term human engineering is used, especially in the hacker community, to refer to talking your way into getting the information you need from a human rather than getting it through a computer. Posing as someone else on the telephone, hackers can get password, configuration information, etc. For example, what would you do if someone called you who sounded like they knew what they were doing and said something like the following. "Hello. This is ***name*** from the IT department help desk and we are having problems with your account. If it is OK with you, all we need to fix it is your password so that we can login to your account, fix the problem, and then logoff. We'll let you know when we are done. It should only take a few minutes.". In a large company you might not know who is calling.

Let us now look at a few examples of aspects of system security for Internet-based systems involving web server and database server.

Firewalls

The typical tiered information systems model of a web-based system consists of the following layers.

- The presentation layer consists of the web browser using HTML that is formatted and displayed to the user.
- The business logic layer consists of a web server with some form of server-side processing, such as ASP.
- The data access layer consists of a database management system such as SQL Server, sometimes with a connection to a mainframe database.

Between the presentation layer and the business logic layer is a firewall that only allows certain TCP/IP messages to pass through the firewall. The Internet is outside the firewall while the local intranet is inside the firewall. Of course, there are more sophisticated configurations where more than one firewall is used, but that is beyond the scope of this discussion.

A free, for individual noncommercial use, firewall software program that the author uses is ZoneAlarm (version 2.1.44) available at http://www.zonelabs.com (as of April 11, 2001). Such software will not only help protect your computer, it will make you more aware of what a firewall program does and how it does it.

For home users connected to the Internet via high-speed Cable Modem or DSL (Digital Subscriber Line) phone access, security can be a problem as computers left on are always connected to the Internet, even when no one is using them who might otherwise notice if something unusually is happening, such as a hacker attack. Installation of a Cable/DSL router, such as the LinkSys, at http://www.linksys.com, EtherFast 4-Port Cable/DSL Router provides a 4-port high speed 100Mbps switch (for client stations) and 10Mbps WAN connection to the cable/DSL connection and provides NAT (Network Address Translation) to isolate the internal home intranet from direct unsolicited access from the Internet. However, if you connect the Internet from the intranet, the connected site can communicate back to the site that initiated the communication. The standard IP intranet addresses are as follows.

- **10.x.x.x** (class A)
- **172.16.x.x** (class B)
- **192.168.1.x** (class C, supported by the above router)

Most companies and academic institutions use NAT to isolate the intranet from the Internet. In most cases, direct access to SQL Server is only allowed from within the firewall (i.e., on the intranet). Thus, users outside the firewall cannot directly access SQL Server. Instead, the firewall allows traffic on the **http:** port (port **80**) and the **https:** port (port **443**) to pass through the firewall in both directions. Often, some other ports (e.g., email) may also allow messages to pass. Since the web server is inside the firewall, it has direct access to SQL Server. Thus, the web server acts as a intermediate control point between the user and the database. Thus, if the ASP server-side processing code were written correctly, and there were no software bugs in the system, then, the human factors of cooperating users would be the primary security problem. But, since many bugs exist in the systems software, and the programmer-written application-specific software (e.g., ASP pages) is not written bug-free, an uncooperating-user has many opportunities to break the security of the system.

One common problem is a hacker stuffing an input field with values that were not anticipated by the programmer. Normally, when writing self-contained software that will run on one computer at any one time, the programmer assumes a cooperating-user model whereby if all code within the program checks the validity of parameters passed to a procedure, that procedure need not check those parameters for validity (Nicklaus Wirth, inventor of the Pascal programming language used this model in his design of the Oberon system, which never gained the popularity of the predecessor languages Pascal and Modula). Although this approach can make for a more efficient program, the assumptions do not hold in a distributed web environment. In general, parameters should be validated at the client browser, must be validated at the web server, and should be validated again at the database server, just in case. One must also look at how the input data is used.

If the input data is to be displayed as HTML, then a hacker could input code that, when displayed as HTML, would, say, load an ActiveX control from someplace on the Internet. If the ActiveX control gets loaded, and is given access to the user's computer, as might easily happen, then the ActiveX control could do anything it wants on the user's computer. This is not good.

One way around this problem is not to display HTML directly. The **Server.HTMLEncode** function will, for example, convert "**<TAG>**", which, depending on the **TAG**, could do something bad, to "**&lt;TAG&gt**", which will display without any side-effects.

Another problem might be that if single-quotes are included in the input, and that input is passed to SQL Server as an encoded SQL command, then the single-quotes might mess up the query. One way around this problem is to replace all single quotes in such text strings with two single quotes so that the SQL command is interpreted properly.

The problem with such pages not working right might be a direct security problem. In other cases, the page might just not work right. But, when a page does not work properly, sometimes the error message might give useful information to an attacker, besides just looking bad to the viewer.

It must be remembered that even if data validation is done at the client web page, the knowledgeable hacker need not use that web page. All parameters from an HTML page are sent to the web server in a well-known format. Anyone can do a "**View Source**" and see how the parameters are sent. Thus, a hacker can send the input directly circumventing any checks made at the client web page (e.g., using built-in HTML limitations, JavaScript validation, etc.). To see that this feature can often be used for good by users, consider the following. The Winthrop library has a way that one can look up books on-line through the web. It is somewhat cumbersome, but it works well. The library uses URL-encoded parameters and it is easy to figure out how it does it. So, the author has set up a page with references for certain textbooks with the URL encoded to directly look up the books along with the current status (e.g., on-the-shelf). This is a good use of a feature that can be used for devious purposes by hackers in other contexts.

Microsoft Internet Information Server

The use of Microsoft IIS as a web server could easily fill several huge books (see, for example, [1], [11]).

The most secure web servers only allow client browsers to request static HTML pages without any server-side processing. However, to be useful, a web server needs to provide some form of server-side processing.

The rights that a web page with server-side processing has on the web server can be a combination of "**Read**", "**Write**", "**Script**", "**Execute**", and/or other rights supported on that server. Usually, on a web server that supports server-side processing, "**Read**" and "**Script**" are granted in most directories. However, directory browsing should be turned off so that a client browser can only access files that are linked, in a transitive manner, from the main web page. Having "**Read**" access but not directory browsing access means that one can read any file or subdirectory in the directory, but one cannot see what is there. One must, instead, know what files and/or subdirectories are there. "**Script**" access allows scripts, such as ASP scripts, to execute on the server.

To be safe, one should turn off or not install options, such as FrontPage Server extensions, which contain security problems, unless one has a good reason use them. As a practical matter, a good way to do this is to get the web server running with all options installed, and then remove them, one by one, every few days, or weeks, so that if removing any one of them causes any problems, it should be easy to detect what change caused what problem. The worst way to do it is to make a lot of changes at one time since if there are any problems, you will not know what caused the problem, especially if care was not take to document the exact changes as they are made.

One useful design is to create a front-end web server, outside the firewall, perhaps hosted by at a site through an ISP, that serves only static HTML pages. The front-end site has a link to a back-end web server that requires that the user login. From the server point of view, each web page transaction is separate from each other web page transaction. However, the use of cookies allows the web server to track client behavior from client requests to client request in what is called a session. Systems such as ASP make tracking such sessions fairly easy and transparent. The user can be authenticated once and then tracked in a session variable until it expires. Or, the user can be authenticated on every access by passing the login parameters (i.e., user name and password) from access to access, which obviates the need for cookies or for the client browser to have cookies enabled. If at any point a request is made that does not have the required user name and password as parameters, the login box appears before anything else can be done on that site. Better yet, use the session authentication and, if cookies are not enabled, use the page to page authentication.

There are two primary ways to pass parameters from client machine to web server, **GET** parameters or **POST** parameters. A **GET** parameter is a URL-encoded parameters. However, **GET** parameters are not very secure as the URL is passed as plain text, can be saved and/or bookmarked as a favorite, appears in the history list, etc. Such parameters are nice for saving queries from search engines, so that the exact page can be found again, but are not good from a security point of view. Most secure pages use **POST** parameters whereby the parameters are passed in the body of the **http:** message. However, this is only useful only as long as eavesdropper cannot monitor and read the message. This requires that the messages sent between client browser and web server be encrypted which requires a brief overview of cryptography as it relates to web systems.

Cryptography

Communication using cryptography involves the sender encrypting a plain text message and transmitting it to a recipient so that it can be decrypted to the original plain text message by the recipient while anyone else who has access to the message should be unable to decrypt the message to the original plain text.

Efficient symmetric cryptography methods such as DES (Data Encryption Standard) exist to securely encrypt/decrypt messages by use of a symmetric key, provided that both sides have the key. The primary problem is in key distribution as encryption using the existing keys cannot be safely used to send the new keys.

Public key cryptography, or asymmetric cryptography, partially solves the key distribution problem and makes possible the concept of digital signatures. The most popular public key cryptography method is the RSA (Rivest, Shamir, and Adleman), the details of which are not important here. What is important is that each user has a private key and a public key. Given the public key, one can encrypt messages, but one needs the private key to decrypt messages. Software can generate both private and public key pairs for any user. As keys are public, the key distribution is partially solved.

But, how does one know who the message came from? Since one can encrypt or decrypt plain text, user A can decrypt a plain text message first, then encrypt it with user B's public key and send it to B. Now, only user B can decrypt the message and then encrypt it using A's public key to make sure that it only came from user A, as only A can decrypt the message. This concept is the basis for what is called a digital signature.

In general, asymmetric cryptography is much less efficient than symmetric cryptography. So, in practice, messages consist of two parts. One part uses asymmetric cryptography to form the digital signature and exchange symmetric session keys, good for only that message or session. The rest of the message uses the more efficient symmetric cryptography. This method was made popular by the email program PGP (Pretty Good Privacy).

Secure sockets layer security

The web incarnation of public key cryptography is called SSL (Secure Sockets Layer) security. If enabled on a web server, it uses, by default, port **443**, for a service called **https:**, as opposed to the standard **http:** service on port **80**. SSL is easy to enable on a web server, if supported (as it is on IIS). The more bits used, the more secure is the communication. However, decisions involving how to use SSL are sometimes complicated. There is just one setting in one dialog box in IIS on the web server that sets the encryption strength security required to access the web server, and it is easily changed.

In general, the web server owner must make the final decision based on how much risk of information compromise they are willing to tolerate in relation to the configuration problems that clients with older browsers might have upgrading their older browsers to the required encryption strength. Since even 128-bit encryption is not absolutely safe, there is always some risk of information compromise, so that is not the question. The question is how much risk of information compromise is tolerable. A reasonable compromise would be to set the required encryption strength to 40-bit encryption, which would handle most browsers, and strongly recommend to clients that they use 128-bit encryption strength (which would still be supported by the server). Any client doing any transaction on the Internet that involves personal information that might be compromised should never use less than 128-bit security, but that is a decision that clients should make on their own and not be forced unless the server owner is not willing to tolerate the risk of a less secure transmission method.

The encryption strength, measured in bits, must be one that is agreed on by everyone in the industry. You cannot use an arbitrary number. Some current standards are 40-bit, 56-bit, and 128-bit. Ignoring some mathematical points, adding one bit essentially doubles the security of the encryption. So, 56-bit encryption is about 65,000 times more secure than 40-bit encryption. And, 128-bit encryption is a million-million-million times more secure than 56-bit encryption. It is believed that only agencies such as the NSA have the resources to break 128-bit encryption. On the other hand, breaking 40-bit encryption can be done by motivated college students without too much difficulty and without requiring too much time.

The guideline for the client is that the client should use the strongest encryption available and that is supported by the server. The server can be set to always accept 128-bit encryption even if it is set to accept a lower level of encryption. The guideline for the server is less clear, as it involves making a business-technical tradeoff that can not be made based only on technical decisions. The decision depends on how much risk the server owner is willing to tolerate.

For example, in banking, if the server owner (the bank) decides to use lower encryption, and someone breaks it and steals money, the bank is taking the risk. So, the bank would typically require 128-bit security. The same reasoning applies for credit card transactions over the Internet. Due to U.S. law, the merchant and/or bank would be liable in most cases, so they are taking the risk and would usually require 128-bit security. As a client, I do not want to take a chance on the risk and the time and effort to make things right, so I would opt for 128-bit security.

From a security point of view, one wants the strongest encryption possible. One drawback is that it requires more processing on both client (not very important) and server (could be important with very high volumes of sessions using encryption).

The primary practical problem with requiring 128-bit security is that clients with older browsers would have to upgrade those browsers to use a higher encryption strength. This could present significant problems if the users in question have older browsers and are not computer savvy about performing the rather simple (for computer savvy users) upgrade themselves. Due to changes in the U.S. export restriction laws, all new browsers (e.g., I.E. 5.0 and above) come with 128-bit encryption, so this problem should become less and less important in the future.

There have been bugs in software that has crippled the use of SSL. An early version of Netscape had a predictable way of generating private keys. Later, it was demonstrated how to patch an executable version of Netscape so that it would always use the same private key. So, using SSL is only as good as the system in which it is operating, which changes every time that a client browser or web server is modified.

User authentication

Usually, some form of user identification along with a password is used to authenticate the user to the system so that the system is fairly confident that the user is who the user claims to be, the definition of authentication.

NTLM (NT LAN Manager) authentication is used by NT/2000 for authenticating users. Without getting into details, it works using a form of public key cryptography whereby the server can authenticate the client without the password every passing over the wire. This is achieved by passing information back and forth so that the server, but not an eavesdropper, can authenticate the client. Since every process on NT must run by impersonating some valid user account, and since NTLM does not provide NT with a userid and password, and since NT security does not support delegation, access to the hard drive and other resources (e.g., SQL Server) can be a problem under NT. One is left compromising security to some extent.

On IIS, one can use no authentication (the default for most users browsing web sites), or other forms of authentication. NTLM is sometimes used, mostly in an intranet environment. Client-side certificate authentication can also be used (see certificate-based security below). Unfortunately, NTLM authentication authenticates only the client to the server, not the server to the client. Microsoft has adopted a form of Kerberos security for Windows 2000. The primary importance of Kerberos security is that it authenticates the server to the client. In a multi-server environment, such as a web server and database server, each server can be authenticated to the other as trusted so that client login credentials can be used to safely impersonate that client by one server in requesting services from the other server using the rights of the client, thus solving the delegation problem. Thus, one can use Windows login authentication on the web server and pass that authentication on to SQL Server.

Server authentication

The purpose of the encryption security is to establish a secure connection between the client and the server so that an eavesdropper cannot listen in on the conversation (e.g., to get login names and passwords, to get information, etc.). The login name and password is used to authenticate the client to the server, but how does the user know that the server is who the server claims to be.

For example, when the URL **http://www.company.com** is typed and **Enter** is pressed, how do you know that you have reached the company who owns that URL. The DNS (Domain Name System) is a distributed database system that is responsible for converting domain names, as used in web URL's, into IP addresses. It is possible, and it has happened, that a hacker could do the following.

- Copy a companies web site from the Internet and modify it on their own site as a Trojan horse web site.
- Break into one of the primary DNS computers and have the domain name point to their Trojan horse web site. Another, perhaps easier, way is to call the right office and use what

is called human engineering to talk someone into making the switch.
- Now, the Trojan horse web site can pose as the real web site, at least until the company whose web site has been hijacked finds out and takes some form of effective action.

So, again, how does the user and/or client browser authenticate the server? To partially solve this problem, certificate-based security was developed to authenticate the server to the client. The system works by creating a hierarchy of certificates that involve cryptography and trusted company verification that the certificates are valid. Although full of loopholes, this is the current state of the art in server-based authentication.

In particular, one weak point is that how does one know whether to trust a certificate. Most trusted certificates are issued by companies such as VeriSign (a spin-off from RSA Systems). But those certificates can be costly ($100 to $1000 or more per year). And, if you have multiple web servers and/or IP addresses, change domain names, change IP addresses, or lose your certificate or password, you will need to get a new one. Of course, you can get a certificate from a less-trusted source. Or, to avoid all costs, you can become issue your own certificates to yourself using Microsoft Certificate Server, included with IIS. But, even if you get a certificate from a trusted source, such as VeriSign, that is no guarantee as the checks on requests for certificates are minimal, in most cases, and although there is a provision for revoking certificates (in a way that is similar to the expiration date on a credit card), most software does not support such revocation. In early 2001, a hacker posing as a Microsoft employee used human engineering to talk someone at VeriSign into issuing two digital certificates to the person with Microsoft as the trusted source as verified by VeriSign. Shortly after it was discovered, Microsoft started working on patches and VeriSign revoked the certificates, but the existing system for checking for revoked certificates is not really reliable or even used in most cases. Such a certificate would allow a hacker to have complete control over a client computer if that client computer downloaded an ActiveX control and trusted Microsoft the download. This would happen automatically if the user had checked the box to "Always trust Microsoft". The Microsoft fix would, presumably, check for that particular certificate, but there could still be problems. Returning to the user authentication using parameters passed from client browser to web server, the web server should have SSL turned on and require secure **https:** to the pages that are to be secure. In addition, the web server should install the necessary certificates to reasonably prove to the client that the web server is who the web server claims to be.

Microsoft SQL Server

The use of Microsoft SQL Server as a database server could easily fill several huge books (see, for example, [3], [7]). SQL Server installation is fairly straightforward. SQL Server is normally behind the firewall and is only directly accessible from the web server and from client computers within the intranet.

SQL Server has an extensive security model consisting of users, logins, roles (i.e., groups), and permissions for users, tables, views, stored procedures, etc., much of which is beyond the scope of this paper. One users, logins, groups, roles, etc., are set up, security access to SQL Server can be via integrated security using Windows login (e.g., NT authentication), or mixed security, which uses SQL Server standard login using userid and password (not as secure over the wire, so you want traffic to and from SQL Server hidden from the outside world). Since integrated security cannot be used in an NT environment from the Internet point of view, the userid and password for standard security appears in each ASP web page that does database access, so you do not want anyone to be able to view the source code of ASP web pages. Hackers are always looking for bugs that would allow them to view the source code of ASP web pages in order to obtain such information. There are known bugs that allow them to do this, so make sure that you have the most recent updates to your web server.

From a web system point of view, each ASP page, which by default impersonates the **IUSR_MACHINENAME** user, must have a user login and password to access the SQL Server database. Prior to Windows 2000, standard login was the approved way to access SQL Server as even though the web server might use Windows authentication, there was no way to delegate to SQL Server the same authentication rights. Since NT authentication for **IUSR_MACHINENAME** does not match any client authentication using NT authentication, and that authentication cannot be delegated, one is left with standard SQL Server login.

A VPN (Virtual Private Network), as supported by Windows, provides a way for a client computer to connect to an intranet by tunneling through a firewall using an existing Internet connection. Once connected, it is as if the client computer were actually on that intranet. This is important if one need, say, to access SQL Server from the Internet as the firewall will not permit direct access. VPN's provide a convenient way to connect to an intranet without using a dial-up connection with a modem, which can be even more of a security problem. Anyone using Microsoft VPN software should update to the latest version (1.3 or higher) to avoid certain well-known security problems with earlier versions.

Summary

This paper has covered just a few of the many important computer security aspects of installing and running Microsoft Internet Information Server as a web server and Microsoft SQL Server as a database server.

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Improving Interpersonal Skills in Introductory Computer Courses

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Abstract

In order to be successful in information technology it is important that employees are competent technically. Equally important is that the employees have communication skills, both verbal and written. Information technology programs typically focus on developing the technological skills and often times leave the communication skills to the Speech and English courses. Talking with employers indicates that IT workers still lack in communication skills. One thing that we do in our introductory information technology class is include many activities that promote verbal and written communications. These activities are easy to incorporate into courses. This can be accomplished in either introductory or advanced level courses. In this paper I will discuss some of the more successful activities and some activities which weren't as successful that we've included in our CPT 135 PC Technology and Applications course.

Introduction

The Computer Technology Department is in Purdue University's School of Technology. The Department of Computer Technology provides educational experiences for students to develop and manage business computer applications, management information systems, databases, and computer networks. The program provides a strong emphasis on the technical skills necessary to be successful in industry while providing additional courses that develop well-rounded students. Many of these additional courses involve techniques that enhance the written and oral communication skills of the student.

Are we successful in developing information system professionals? Yes, our department has a 100% placement record over the most recent year of statistics and salary ranks near the top of all students graduating from Purdue University. Can we improve the product? Certainly, we can! As a faculty member I talk with recruiters and staff from companies in search of quality information technology (IT) professionals. The typical technical skills request list, like Oracle experience, Visual Basic programmer, NT experience, etc. are mentioned depending on the skill set needed by a particular company. However, one skill that is requested across the board is strong communications skills. Companies are looking for employees that are not only technically strong but that communicate well. In fact a complaint often heard is that students are technically strong but weak in oral and written communication skills. Apparently, this is widespread concern. A survey of Central Indiana companies sponsored by Indiana Information Technology Association and Ivy Tech State College tends to confirm this. Sixty-one companies responded, and the consensus was that when workers could be located, they turned up short on the communication skills. "You find people who have great technical skills, but you can't put them in front of a client" said Ron Brumbarger, president of BitWise Solutions in Carmel (1).

Instead of leaving the interpersonal skills to the other courses in our curriculum, I have tried to give the students opportunities to practice what they learn across the curriculum, I focus mainly on courses in the CPT department where I teach. Specifically, I am going to discuss some activities that I've included in our introductory computer course. The course is CPT 135, Personal Computing Technology and Applications. The course provides an introduction to typical personal computing applications. Students gain hands-on skills and experience with personal computer applications such as desktop and file management, word processing, spreadsheets, presentation graphics, electronic mail, and internet browsing and searching. This course surveys personal computer technology and problem solving. Topics include computer hardware, computer operations, operating systems and environments, and computer ethics. Technologies include Microsoft Office and Microsoft Internet Explorer. This course seems like a perfect place to begin, since this is the first CPT course that our majors take and it is also a service course that many other majors take for their required computer course. The class always produces a wide variety of students with varying degrees of technical skills. This is exactly the environment that many of our students will be involved in when they work in industry. Following I will list some of the activities that I've incorporated into the CPT 135 class that try to reinforce the interpersonal skills necessary for our students to be successful in their IT careers.

Interpersonal Skills Activities

Article Summaries

Students were told to read an article about computer technology and write a summary. Students were required to do two of these assignments. The article was supposed to be in an area of interest for them, career, hobby or just a special interest. The summaries were to be no longer than one page in length and completed using Microsoft Word, the word processor used in the class. Both articles were due after students had completed the labs using Microsoft Word. On the due date I solicited students to discuss the articles. Many seemed genuinely interested in what they had read. Reading the summaries I found the biggest weakness was in summarization skills. Students had a difficult time summarizing the articles in a concise manner.

Paper

Students were required to write a five-page paper on a topic related to computer technology. The students had to have three outside sources and a bibliography. As with the article summaries students were asked to find a subject of interest, either related to their major, hobby or a topic of interest relating to computers. Students could also learn a new skill using computers (outside the scope of the CPT 135 class) and write their paper on the experience. Students also were allowed to interview people using computers on a day-to-day basis and summarize the interviews. Students were required to use the Microsoft Word to create the document. The paper they developed were the source for another activity (presentation) later in the semester. For the most part students played it safe when picking a topic for the papers. In the four times I've tried this in the class over the last two years, I've only had three students who have chosen to interview a person. I've found in these cases that the person interviewed a friend or relative. In fairness, the students may have found the interview difficult to fit within format of the required presentation. As far as students learning new technology, few students have ventured in that area also. A couple of the more interesting examples were when a student taught himself FrontPage with the aid of a book and developed his own web page for the presentation. He did a thorough job and it made a good presentation. In another case, a Purdue Technology student taught himself the basics of a CAD program that he would be using the next semester using a tutorial. Most students were cautious when selecting topics, some choosing hobbies or topics relating to their majors but many chose from a suggested list that I passed around. I can't count the times I've heard about Charles Babbage and the history of computers in the last two years!

Presentation

At the end of each semester each student must create and deliver a Powerpoint presentation. The presentation is based on the paper that they completed earlier in the semester. The presentation is between 6-10 minutes in length. Students must use Powerpoint using at a minimum of six slides. The student is expected to deliver a professional talk which they will be graded. Students are also graded on how effectively they use Powerpoint including things such as adding graphics, animation, transitions and actual readability of slides. Students also rate the presenters based on their content and presentation. In fact I have them make individual comments and then pick the student with the best presentation and best content and give those students several bonus points. Typically, students have turned in their papers shortly after midterm and have their papers back and graded with comments before they put together their presentation. Another way I have tried this is to have both paper and presentation due at the same time at the end of the semester. Instead of using the extra time for writing the paper students tended to wait until the last minute to prepare both assignments and the quality of both suffered. The quality of the paper and presentations were definitely better when the assignments had separate due dates.

Team Activities

During the semester I have several activities that students perform in teams. Most times I assign the students to teams of two to four, depending on the exercise. Following are some of the activities that I have students perform in teams. Many times I use the teams to liven up topics from lectures that can be dry if all that occurs are lectures.

Hardware Purchase Activity – This activity is now done using the internet, but the first time I brought in ads from the local newspapers. I divide students into groups of two to three and give each team different scenarios. The I ask them to find the various hardware components, a hard drive, monitor, printer etc. that best fits the scenario they have been presented with. Typically, students are told to find the two or three best choices and then defend their choice to the class. When students explain their choice they are required to explain all the "buzz" terms that are associated with their purchase. If they try to skip specifics, I will ask leading questions to help bring out the important points. Over the last couple years this activity is has probably been one of the more popular activities. Students really seem to enjoy this activity, trying to come up with the best fits for the scenarios that they have been given to present. Given different scenarios this exercise can challenge the stronger students along with the students who are novices.

Teach the Class – A week before a chapter from the text is to be covered in lecture I divide students into teams of three to four. Students are then given a section over the chapter that they are responsible to teach to the class. Students are given freedom on how they teach their section. They are generally given 10-15 minutes to teach their section. Students are encouraged to not only use the text but also bring in any other related material. The students are given about fifteen minutes in the class before they teach the section and about 10 minutes at the start of the class to get organized. Also, students are required to submit five questions over the material they present that I use in developing a quiz. Most of the time students utilize Powerpoint, a presentation tool that we use in the lab portion of the class. I would not consider this activity as one of the more successful attempts. Students tend to break their sections up and then each student will discuss his/her section. Many times students write notes that are almost word for word from the text and then read their notes with little or no understanding. The students didn't seem to enjoy this activity and rarely used outside sources. The activity seemed to do little to encourage teamwork and presentations tended to be unimpressive. It didn't seem to matter which topic was chosen, the results tended to be the same.

Website Evaluation – For this team activity students were given two websites to view and evaluate. We had briefly discussed things to look for and how we would evaluate a website before the exercise began. The goal was for students to look at the material on the websites and critically evaluate the material there. I try to pick topical, somewhat controversial sites for students to look at. The exercise occurred this past time on election day, so the students had to evaluate websites devoted to the presidential candidates from a "far right" website devoted to Al Gore to a teenagers for Bush website. Students got into lengthy and sometimes spirited discussions about the sites and validity of the content. This has been a popular activity with the students and one that has led to the most participation among the class as a whole.

Discussion of Articles

In the lecture portion of the course we have a chapter discussing ethics, computer crimes and effects of computers on society. The week before the lecture, students were assigned to find articles that directly related to a specific topic in the chapter. The following week as I lectured, students were instructed to discuss their articles as I covered the content. I had hoped the current articles would spark conversation and possibly debate about some of the topics in the text. What I found was that everyone had articles and some more than willing to expound on their topic. However, most of the articles tended to center on very specific areas of the chapter (usually computer crime) and the hope for discussions didn't occur. This past semester is the first time I tried this exercise and although everyone participated I'm not sure it was the thought provoking exercise I had anticipated when I made the assignment.

Conclusions

The activities I've discussed in this paper were included in the introductory computer class to enhance the interpersonal skills of students. The class itself is a lecture/lab class with lecture dealing with topics related to computers such as hardware, software, networks, internet, etc. and the lab devoted to developing skills with word processing, spreadsheets, presentation graphics, email and using the internet. Most of the activities have been developed so that they require skills used in the lab portion of the class and in all cases when activities are graded, part of the grade is based on successful use of technology. In this case I hope to reinforce the importance of using the technology presented in the course. As mentioned in the introduction, a primary goal is to develop interpersonal. This is not an English or Speech class but the intention of these exercises is to emphasize the importance of these skills to our CPT majors and to do it from the very beginning of their educational experience with Purdue University. The survey of the Indiana Information Technology Association (INITA) stated in each category of employer, the biggest deficiencies were not in technical skills but in interpersonal skills. In fact, over sixty percent in each category listed interpersonal skills as a deficiency among job applicants as compared to generally forty to sixty percent in the different category of employers who listed technical skills (2). As interesting was when employers were ask to prioritize current and anticipated (over the next 3 years) skills required, the "soft skills" made up eight out of the top ten skills required with teamwork, verbal communications, written communications all in the top five skills named (2).

The activities I've used in the CPT 135 course emphasize the interpersonal skills that employers are finding lacking in their job candidates. Not all of the activities have proved successful. I plan on reworking several of the activities to get more involvement by all of the students and improve the quality of the exercise to meet the objectives of the activity. The activities that have been a success I plan to continue to include and if possible incorporate into other courses in the CPT curriculum.

Summary

Interpersonal skills are important for the information systems professionals and if we are developing these professionals it is not enough to depend on the Speech and English courses in our curriculum to do the job by themselves. We need to reinforce the importance of these skills to our students along with the need of strong technical skills. For that reason it is critical to emphasize the necessity of theses skills from the very first course in CPT and continue to develop these skills as students go through the program. Hopefully, some or all of these activities may be used in other computer courses to enhance the interpersonal skills of our students.

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The Use of Technology by Beginning Teachers to Assess Skills in Elementary Physical Education Students

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The purpose of this presentation is to share a teaching idea involving the use of a digital camera and a digital camcorder in an elementary physical education setting. College students were asked to use both devices to qualitatively assess locomotor and manipulative skills. A secondary purpose of this session is to show the importance of involving beginning physical education teachers in the use of technology for assessment. Students can be assessed on meaningful content using a variety of technology tools. The technology projects that will be shared are derived from class projects by undergraduate students in an elementary physical education methods course from a small university. This course was co-taught by an elementary physical education teacher and a university professor. Ideas and strategies will also be shared on how these projects can be adapted to middle and high school physical education settings as well as in the classroom and community.

(This paper was not available at the time the Proceedings went to press. The author will supply copies of the papers at her talk or provide a url if it is posted on the web.)

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